Gas Journal

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Editorial Notes

The C.E.B. Report

THE Ninth Annual Report of the Central Electricity Board states that the increase of 2,650 million units in the output of electricity from the public supply stations in Great Britain in 1936 was the highest recorded in the history of the electricity industry; it brought the total production by authorized undertakers in the year to over 20,000 million units. Much of this increase—which on a heat basis is equivalent to something like 18,000 million cu.ft. of 500 B.Th.U. gas—is, of course, traceable to trade revival and rearmament, which have led to the extension of old and the erection of new works requiring electric power, while railway electrification has also been a contributory factor. Domestic sales have increased, but in this connection it is interesting to turn to a Paper read recently at a meeting of the Institution of Electrical Engineers in which an analysis was made of the rate of increase of domestic consumption of electricity for the whole country and it was shown that the average consumption per domestic consumer has not increased in the period 1927-35.

The Board's general trading, which in 1936 was in progress throughout the country except in North Scotland, South Scotland, and North-East England, resulted in a revenue credit balance of £1,689,487. This compares with £1,021,221 in 1935. Of the year's revenue £250,000 has been applied to redemption fund contributions and £1,131,516 has been utilized in the payment of interest on the portions of the first five issues of the Board's stocks allocated to general purposes, amounting to £25,895,000. Actually the Board was empowered to charge the whole of this interest to capital; and it is natural that the Board should express satisfaction in being able to charge interest to revenue in advance of its obligation. The cost of the grid to date is given in round figures as £30,000,000. The total amount which the Board is empowered to borrow remains at £60,000,000, and consents have been issued by the Electricity Commissioners for the borrowing of £52,500,000. During 1936 an issue was made of £3,500,000 stock, raising the total nominal value issued to £53,500,000. The actual proceeds have amounted to £50,672,500, leaving a further £9,327,500 which may be raised under the existing borrowing powers. It must be remembered that interest and redemption fund charges will, for some years, increase year by year.

The average fuel consumption per unit sent out from the 150 stations operated under the direction of the Board was 14% less than the average consumption of such stations when operating under independent conditions in 1932. Owing to the increase in the price of coal, however—12,000,000 tons are used at these stations—more than half of the reduction in fuel cost per kWh since 1933 has been lost. On this question of coal, complaint is made of the difficulties encountered in obtaining supplies of coal in accordance with contracts placed and in making contracts for the delivery of coal of the size and quality for the use of which the boiler furnaces of the generating stations have been designed. This matter is now engaging the attention of a specially appointed committee which is endeavouring to secure from the mining interests an amelioration of the position. Similar troubles are, of course, affecting our own Industry. A fortnight ago we recorded that the Edinburgh Corporation had protested to the Minister of Mines against the coal shortage. The Edinburgh Gas Department suffered shortages totalling 12,000 tons during the winter, and this has forced the Department to cease benzole production. Last week we gave reports on the coal position from other centres. Glasgow Gas Department, for example, ordered 74,200 tons in January and 47,957 tons were delivered. In February the respective figures were 72,750 and 47,259. Depletion in stocks has resulted in a grave situation. It is ironical that, while both the gas and electricity industries can get neither the quantity nor quality of the coal they need, the Fuel Research Board should publish a few days ago a most valuable report containing analysis of 239 commercial grades of coal from 27 collieries in the Nottinghamshire and Derbyshire area. This is part of the scheme for providing reliable data on British coals so that they may be used to the best advantage.

The Institution and its Secretary

PRIME MINISTERS come and Prime Ministers go. Each newcomer hands over to at least a number of Ministers the administration of departments of State of which they apparently have no previous experience. From such a state of affairs we might reasonably expect a series of disastrous crashes but for the fact that we are aware of the existence in each department of a permanent staff which continues to function with rocklike solidity even under the most impossible conditions—the epithet being interpreted according to our own individual shades of political opinion.

Presidents of The Institution of Gas Engineers come and go, bringing with them the policies and ideas of North, South, East, and West. Whether or not we are justified in regarding the President of the year as the Prime Minister of the Gas Industry, and his Council as the Ministers of State, we insist on the analogy in referring to the impending passage to more commercial spheres of the head of the permanent staff.

Through the courtesy of Mr. J. R. W. Alexander we received " stop-press " news of his forthcoming retirement from the Secretaryship for publication last week, but with little time to ruminate upon the progress and achievements of his term of office, which began in 1929. When we now look back over the period, the words of a recently popular song inevitably recur to us. If we may slightly misquote them and say the little man has had a busy time, they seem to us admirably to cover the extremely genial personality and amazing energy with which the Secretary has taken in his stride, so to speak, a period of the Institution's history more crammed full of events than any previous one. We feel quite safe from giving offence by the application of this triviality—albeit a pleasant one—to the affairs of the Institution and its Secretary, because, above all, his zeal for its dignity and the efficient working of its machinery has been patent both within and without the Gas Industry, and combined with his genius for organization it has been of outstanding service to the Institution during the early years of its Royal Charter.

Space permits of only the briefest reference to the work and progress of the Institution since 1929, but one or two facts and figures culled from recent Annual Reports should give members a good conceit of themselves. Membership has increased from 1,405 in 1929 to 1,650 in 1936, and attendances at the June Annual Meeting from 1,000 to 1,500. In addition to this there has, subsequently to 1928, been the Autumn Research Meeting of 400 to 500 delegates. The revenue of the Institution has increased from £3,000 to £4,444, and by a disproportionate increase in expenditure a deficit of £166 was converted into a surplus last year of £491. The revenue of the Special Purposes Fund for Education and Research has increased from £8,100 to £12,000. The income of the Benevolent Fund has risen from £774 to £1,360, and subscribers from 518 to 943. Under the Education Scheme the number of candidates examined in 1936 was 448 compared with 60 in its first year—1924. Communications published numbered about a dozen in 1929; in the next seven years they averaged 21 annually. Volume 78 (1928-29) of the Transactions contained 490 pages; Volume 83 has 1,237 pages. Sales of publications have increased from £61 to £387, while library accessions have grown from 92 to 548 in the period.

Outstanding events during Mr. Alexander's Secretaryship have been the Sir Arthur Duckham Memorial Fund (£10,650) and the W. E. Price Presentation Fund (£400); the 1st International Gas Conference in London in 1931, with 1,500 members and delegates representing 25 nations; the visit to Canada and the United States of 60 members in 1933; the formation of the British Gas Federation, of which he has been Joint Secretary; and the move of the national bodies to Gas Industry House.

This can only pretend to be a brief outline of some of the Institution's activities during the past seven years. The Secretary has naturally been intimately connected with all of them, and if we add that over 100 meetings of the Council and Committees are held yearly, it will be fully realized that he has had a busy life. For our own part we have enjoyed his helpful co-operation in all matters where such was fitting, and we hold to his credit a very proper appreciation of the value to any Industry of a staid, established, and generally accredited Press, and of the worth of publicity in the best senses of the term.

And so the grouping movement, in its inexorable progress through our ranks, has claimed another recruit who has won prominence in the national affairs of our Industry, and when, following the 74th Annual General Meeting of the Institution, Mr. Alexander sings his swan song as its Secretary at the 3rd International Gas Conference in Paris in June, we shall join with many others in wishing him happiness and prosperity in the new sphere of activity to which his talents are taking him.

The Ideal Home Exhibition

THIS year marks the Coming-of-Age of the *Daily Mail* Ideal Home Exhibition, and, appropriately enough, its " Twenty-First " comes at a time when celebrations are at hand—the celebrations of a whole Empire. The Grand Hall at Olympia, transformed into a Golden Hall of Homage, has been conceived as a gesture of loyalty to the Throne in this Coronation Year and constitutes a regal setting for this ever popular Exhibition.

Since it first came into the world in 1908 the Ideal Home Exhibition has grown almost out of all recognition and has gathered round it a host of friends steadily increasing in number with the years—among them hundreds of manufacturers and sellers of the pick of the Empire productions that every year are seen in its halls. With its Coming-of-Age the Ideal Home Exhibition extends the scope of its national service that brings to the attention of the home lover every worth-while development and invention of interest. Such is the setting for a display of gas appliances for all domestic purposes more comprehensive, probably, than any that has hitherto been staged. All the leading manufacturers of domestic gas apparatus have co-operated in producing a series of exhibits well calculated to demonstrate the pre-eminence of gas service in the home—not merely disconnected groups of appliances but rather a display of gas heating, cooking, water heating, and refrigeration service as it might be expected to appear in the home. The modern trend towards more cheerfulness and greater convenience and labour-saving is answered by all the manufacturers in their latest appliances; spotless white enamel, stainless steel, and bright coloured finishes, together with a greater degree of automatic operation, are the order of the day, while practical demonstrations of cooking, ironing, and water heating bring a touch of reality to many of the displays. And that modern gas service is regarded as part and parcel of the home of to-day is amply testified by the many appliances which have been introduced as normal equipment in most of the model houses.

It is this, perhaps more than anything else, that provides the pulling power at an Exhibition of this nature—practical examples of gas service in a modern house.

Moreover, the Ideal Home Exhibition is of practical interest to the Industry itself, for among the exhibits are to be found many gas appliances introduced to the public for the first time, together with important developments to existing apparatus, not to mention the examples which are to be seen on all sides of the very latest and best methods of showmanship. There are, in short, a great many things of close concern to the Industry at Olympia, and if our description of the various exhibitors' displays on later pages of this issue fails in itself to whet the appetite of gas men for the many interesting stands to be seen, we can but recommend a visit to the Exhibition as an acknowledgment of the valuable services our manufacturers are rendering in their efforts to further the use of gas in the home.

Home Oil Production

It has been announced by the Minister for Defence that the storage of adequate oil supplies in this country for use in times of national emergency is under careful consideration. We shall return to that point later, but it is here mentioned to refer to the fact that as soon as anyone brings up the question of oil supplies, the production at home from internal sources is mentioned. The supply of oil derived from the various processes of low-temperature carbonization has always ranked in the forefront of these discussions, and recently reference was made in the House to the supply of such oil for the Navy. Mr. Lindsay gave the information that "the oil from low-temperature carbonization was excellent from the point of view of the Navy, but it cost precisely three times as much as similar imported oil." It was thereupon remarked by a Labour member, Mr. J. Griffiths, that "this statement is of very grave importance to the mining industry. The impression that it will create among technicians, industrialists, and others interested will be that this is a hopeless proposition." Sir Samuel Hoare, however, corrected any impression that the Admiralty regarded the experiment as "hopeless," especially as "the cost figure of three to one was based upon very small data."

It is evident that the oil to which reference is here made is not to be confused with aviation spirit supplied to the Air Force, but is presumably heavy oil for boiler firing. There is so little diesel oil of value produced from low-temperature oils, it is hardly likely that the Admiralty would experiment on so small a scale in view of the unlikelihood of a considerable extension of home supplies from that source. The present quoted prices for bulk oil contracts are 3½d. a gallon for furnace oil, and 4¼d. a gallon for diesel oil ex River Thames installation, to which must in certain instances be added a Government tax of 1d. a gallon. The conclusion is that low-temperature oil of similar quality must be costing the Admiralty three times these figures—which is not far removed from the wholesale price of No. 3 grade petrol—including the tax on the petrol. It is quite obvious that if the information given in Parliament bears this interpretation, or anything like it, the heavier oils derived from carbonization cannot be seriously considered as fuel oils for use in this country, and it would be preferable to convert them into motor spirit at Billingham.

The idea that Mr. Lindsay's disclosure would create an unfortunate impression among "technicians, industrialists, and others" is based on a fallacy. It is a legacy from the bad old days—not so long ago as measured in terms of months—when the magic words "oil from coal" were sufficient to commend to the investing public any process from low-temperature carbonization to the action of radiation on garbage. It is beginning to be recognized now even by the public that is gulled by bucket-shops that radiation has no eldorado-producing effect on garbage, and that all carbonization processes depend for their economic success on the production for sale either of gas or coke, and that oils must be a by-product only; a very useful by-product, but still a by-product. As a by-product, oils can only be produced in quantities which bear a fairly uniform relation to the production of primary products. It is worth while considering the home production of oil from this angle. Neglecting lubricating oils, the present quantity of oils used in this country amounts to some 4½ millions of tons of gasoline annually, nearly 1 million tons of kerosine, and 4½ millions of tons of gas and fuel oils combined—10 millions of tons in all. Official statistics are necessarily issued a long time behind events, but based upon the latest available official figures coupled with an intelligent interpretation of known trends, it can be said that the total oil production from low-temperature carbonization in this country is not greater than 40,000 tons, or 0·4% of our total 1937 requirements—an amount surely by way of becoming equivalent to that $(\delta x)^2$ that mathematicians when studying the calculus bid us neglect as infinitesimally small.

The Position Analyzed

The yield of tar from the gas and coke oven industries is some 2,000,000 tons, or 20% of the total; while the yield of benzole from the same industries is about 300,000 tons, of which about one-quarter comes from the Gas Industry. There is also some 1,500,000 tons of oil produced from the Scottish shale oil industry. In bulk, therefore, the whole of the carbonizing industries produce something less than 40% of our total oil imports. This, in bulk, seems quite a respectable proportion, but a moment's reflection discloses the weakness of our position. We have produced some 4,000,000 tons of oil by carbonization in 1936, and we have also produced about 150,000 tons by hydrogenation. But, *in addition to this*, we have found it necessary to import 10,000,000 tons of petroleum. We have therefore to find means for producing an additional 10,000,000 tons of oil, and also about 500,000 tons of lubricating oils before we are self-supporting in this direction. So far, the bore-holes put down to discover oil in this country have not given cause for hope that British oil wells will be discovered. It must not be forgotten, also, that the tar produced today contains some 50% of pitch, which can hardly be described as a "fuel oil," though often used for combustion; nearly half our tar production is used as road tar, and is not available as fuel oils. Part of the benzole is supplied to the chemical industry as the starting point for dyes, explosives, and what not, and all these uses are more likely to demand increasing, rather than decreasing, quantities of tar.

The production of oil, as has previously been pointed out, must wait upon the production of gas or of coke. By no system of carbonization can an average yield of more than about 20 gallons of oils be recovered industri-

ally; these oils would be suitable for hydrogenation into motor spirit and other fuels. If systems of high-temperature carbonization are employed, the oil production is much less and much of the pitch is unsuitable for treatment to produce fuel oils on account of its low hydrogen/carbon atomic ratio. If, therefore, we can envisage a use for the gas and coke (or for a much greater quantity of gas if total gasification were resorted to) derived from the carbonization of an additional quantity of 140,000,000 tons of coal, we should be self-supporting as regards oil if low-temperature carbonization were used for the whole of this coal; and we should be able to produce just half our present requirements of oil if high-temperature carbonization were used. To produce all our fuel oils at home, gas and coke ovens between them must carbonize over seven times as much coal as they do to-day. It is obvious that carbonization can never produce more than an inconsiderable fraction of our home oil requirements, which in point of fact are increasing each year with some rapidity. Per head of population, Britain is the greatest oil-using country in the world. Carbonization and hydrogenation do not produce lubricating oils.

General Refractories

THE speech of Mr. Frank S. Russell, Chairman of General Refractories, Ltd., at the Annual Meeting of the Company last week was in thoroughly optimistic vein; and we think that perusal of our report on later pages of this issue of the "JOURNAL" will show that this optimism is amply justified. The year's trading of this controlling unit of a combine consisting of a matter of 35 companies has been one of remarkable progress. The group's annual output capacity of firebricks of all kinds—and Mr. Russell was at pains to emphasize that the Company's policy is to deal in refractories generally, as its name implies—rose from 47 millions in 1935 to 87 millions in 1936, the increase in the number of works, mines, and quarries in the group being from 68 to 105. As to the value of the sales, this grew during last year by nearly a quarter of a million pounds—and a still more important increase in 1937 is confidently anticipated. The Company has now acquired almost inexhaustible reserves of high-grade fireclay, and it is the intention of the Company to acquire control of a supply of refractories of every known type and for every industrial purpose. At the close of the annual meeting there followed an extraordinary general meeting at which a resolution to increase the capital by the issue of a further 300,000 10s. ordinary shares was carried unanimously.

Not only the shareholders of General Refractories, Ltd., however, have cause for lively satisfaction with the story of progress which Mr. Russell had to tell last week. The Company's development is bound to benefit all users of refractory materials, and among the large users are to be counted the gas and coking industries. Refractory materials have an important bearing on the smooth working of the gas-making process and on the economics of gas production; and the stronger position and far-sighted policy of the Company will, we have no doubt, be reflected in the availability to the Gas Industry of still better refractory materials. Mr. Russell's comments on research and the setting up of a central laboratory in order to be "in advance of the needs of its consumers" are heartening and very much to the point; and his references to new types of non-spalling firebrick are most interesting. Concluding his speech and looking to the future, Mr. Russell suggested that they themselves could hardly realize the benefits which are likely to accrue through new methods, reorganization, modern machinery, and labour-saving plant.

Our Future Consumers

SUCH of us as are unfortunate enough to have reached the postmeridian period of life will recall the elaborate calculations that were at one time encountered in connection with the probable duration of the country's, and even of the world's, supplies of coal. Stupendous totals were quoted—totals representative of quantities altogether beyond the power of imagination to grasp. But whatever the size of the figures, they led infallibly to one conclusion. The time would arrive—and it was shown to be within measurable distance—when the reserves of coal would be exhausted. And what would Great Britain, and the world, do then? Later on, people learned of a danger that, at some time or another, the soil of the world would be incapable of producing wheat in sufficient quantities to meet the requirements of the teeming populations. Well, so far as coal is concerned, much has occurred in the meantime to undermine the soundness of the edifice erected upon theoretical calculations; while a like fate seems now to await alarmist prognostications in the matter of the future sufficiency of the world's possible wheat supplies.

For, to put it briefly, the crux of the problem would appear to be shifting from production to consumption. No less serious, perhaps, but obviously bringing into play an entirely different set of considerations. The question now presented is, not whether there will be sufficient wheat available, but whether there will be enough people to consume what can be grown. The Population Investigation Committee, who are busy upon the subject, have issued a pamphlet one section of which is intended to show that, unless drastic changes occur in family life, the population of this country—and we know that similar tendencies are discernible in other countries—is destined after some fifteen years or so to enter upon a period of increasingly rapid decline. The Committee also discuss the further knowledge that should be obtained in order that the economic and social effects of a shrinking population may be estimated and the decline checked in so far as this is desired. Influences tending to a decline in the birth rate must be perceivable by all, though every person may not have it in his power to do anything to negative them. Those who have, should exercise this power. That is why it was such a pleasure to note, at the opening of Kensal House, the big effort—and successful effort—that has been made by the Gas Light and Coke Company to foster "family life" in these flats. Social amenities have rightly been regarded as among the foremost requirements, while the Nursery School marks the scheme as a powerful and broad-minded effort in a direction in which effort is needed. Children will be no drawback at Kensal House, which is well.

A dwindling population would not make for fewer unemployed, because consumption would be proportionately—perhaps even more than proportionately—diminished. The Gas Industry, no less than others, counts upon a growing population to provide the constant stream of new consumers to which it is accustomed. This is why the Gas Light and Coke Company's enterprise at Kensal House, fully described in the "JOURNAL" a fortnight ago, has given us—and others—so much satisfaction.

MR. J. A. MORRIS

Retires After 50 Years' Service with the "JOURNAL"

It falls to the lot of few men to take an active part in the production of more than 2,500 issues of any weekly paper. Such, however, is the record of Mr. J. A. Morris, who retired from active participation in the affairs of the Gas Industry after seeing the advertisement pages to press for our issue of March 31.

It is more than 50 years since Mr. Morris joined the staff of Mr. Walter King, then Proprietor and Editor of the "JOURNAL." In a lifetime of unswerving devotion to duty, and of unselfish service first to Mr. Walter King and later to the Company which Mr. King founded, he has endeared himself as few men are able to do to everybody who has had the fortune to work with him. He takes with him into retirement a full measure of gratitude which Mrs. Julia King, on behalf of the family and especially of her two sons now active in the business, was happily able to express to him at the Company's Annual Meeting last week. He takes with him, too, the best wishes of a host of friends, both of other generations and of this, with whom he has come in contact outside the "JOURNAL" office; it is difficult for us who know him best to imagine that Mr. Morris could have an enemy in the world.

Way back in 1886 when he joined the "JOURNAL" it was all hands to the pump on press day, and the varied experience gained by all members of the staff in those days fitted them for later development in whatever direction their talents led them when specialization became the order of the day. In 1909, Mr. Morris became Advertisement Manager, a position which he held until his retirement last week; but his vast experience of the business was ever at the disposal of all who needed it, and, busy man as he was in his own department, he was never too busy to give the helping hand in whatever direction it was likely to prove useful to the business to which he devoted his working days.

When Walter King, Ltd., was formed in 1921, Mr. Morris threw in his lot with it as a shareholder, and in 1934 he accepted a seat on the Board. Fortunately his valuable services as Director will continue to be given even though he has retired from more active work.

To his very last day as Advertisement Manager Mr. Morris was first in and very nearly, if not quite, last away from the office, thus maintaining to the very end of his active service the habits of 50 years. A rough estimate of the number of hours of solid work which he has put in for the "JOURNAL" indicates a truly formidable total. In spite of this, sickness has been practically unknown to him, and it is our great joy that he carries with him into retirement every bit of the robust health and strength so clearly indicated in the portrait which he has been persuaded, under great pressure, to have taken in celebration of the occasion. We wish him many years of happiness in which to enjoy his leisure.

The direction and internal organization of the Advertisement Department are to be carried on by Mr. Clifford A. King. External representation, which has been the subject of considerable development in recent years, will remain unchanged.

W. R. K.

Personal

South Metropolian Appointments

The Secretary of the South Metropolitan Gas Company informs us that the following appointments and allocation of duties have been made by the Board of the Company: General Manager, Mr. E. V. EVANS; Chief Engineer and Works Manager, Mr. A. H. ANDREWS; Comptroller and District Manager, Major F. J. BYWATER.

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Mr. HAROLD L. MURPHY, K.C., was elected a Director of the South Metropolitan Gas Company on March 31.

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Mr. R. J. SMITH, formerly Sales Manager of the National Benzole Company, Ltd., has been appointed to the position of Assistant General Manager of the Company.

Obituary

The death occurred on April 1 of Mr. ALEXANDER HAZEL SMITH at the age of 74. Having served his apprenticeship at Enniskillen, Ireland, he was appointed Engineer and Manager at Llandudno. In 1895 he received a similar appointment at Darwen, which he held until his retirement in 1931.

Forthcoming Engagements

April.

8.—S.B.G.I.—Council Meeting, 2.30 p.m.
9.—NORTH BRITISH ASSOCIATION.—Spring Meeting at Edinburgh.
9.—B.G.F.—Exhibitions Committee, 3.30 p.m.
13.—N.G.C.—Central Executive Board, 2.30 p.m.
14.—GAS COMPANIES' PROTECTION ASSOCIATION.—General Meeting at Caxton Hall, 2.30 p.m.
14.—B.C.G.A.—Eastern District Members Meeting at Cambridge.
16.—B.C.G.A. SALESMEN'S CIRCLES.—Annual Meeting, Caxton Hall, Westminster, 10.45 a.m.
17.—LONDON AND SOUTHERN JUNIORS.—Visit to Watford and St. Albans Gas-Works.
17.—MIDLAND JUNIORS.—Visit to Leamington Spa.
17.—WESTERN JUNIORS.—Annual General Meeting at Clevedon. Presidential Address by S. B. Jones.
21.—B.C.G.A.—Executive Committee, 11.30 a.m.; General Committee, 2.30 p.m.
21.—I.G.E.—Pipes Committee, 3 p.m.
22.—I.G.E.—Joint Lighting Committee, 2.30 p.m.
23.—B.C.G.A. — Midland District Conference at Gloucester.
23.—I.G.E.—Gasholder Committee, 2.30 p.m.
24.—WALES AND MONMOUTHSHIRE JUNIORS.—Annual General Meeting at Porthcawl.
24.—YORKSHIRE JUNIORS.—Meeting at Bradford. Paper by H. Johnston, "Materials and their application to Gas-Works Constructions."
28.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Alternative Methods of Electricity Supply on a Gas-Works."

News in Brief

CURRENT EVENTS IN THE GAS INDUSTRY

The Price of Gas has been reduced by the Braintree and Bocking Gas Company by 3d. per 1,000 cu.ft. as from the March meter readings.

Gas Mains Extensions involving an outlay of £2,200 were recommended for approval on March 30 by the Gas Committee of Aberdeen Town Council.

The Laying of Gas Mains in congested areas was the subject of a Paper by Messrs. G. H. Rodgers and J. E. Gray before the Junior Institution of Engineers on March 19.

An Increase of 19·6%, from 518 million to 620 million cu.ft., in the output of gas has been recorded by the Chesterfield Gas Department for the year ended March 31, 1937, we are informed by the Engineer and Manager, Mr. Harold Davies.

Application for a Special Order under the Gas Undertakings Acts, 1920 to 1934, is intended to be made to the Board of Trade by the Stanley and District Gas Company with the object *inter alia* of conferring upon the Company statutory powers.

A Lecture on "The Present Position and Prospects of the Coal Industry" will be given before the Royal Society of Arts by Captain John P. Dickie on Wednesday, April 14. Applications for tickets should be made to the Secretary, John Street, Adelphi, W.C. 2.

After a Discussion in the Edinburgh Town Council of a recommendation by the Public Utilities Committee it was decided by a large majority that representatives be appointed to attend the Triennial Conference of the International Gas Union to be held in Paris in June.

For a Further Five Years St. Andrews Town Council have agreed to continue the contract held by the St. Andrews Gas Company for street lighting. At the expense of the Company, South Street, Market Street, and North Street are all to be lighted by four-cluster lamps.

An Experienced Accountant is required by the Malta and Mediterranean Gas Company to take charge of staff, office organization, and book-keeping system in Malta. Further particulars of this appointment, which carries a salary of £320, will be found in our advertisement columns.

The Substitution of a Basic Price for the present maximum price and certain provisions in regard to the capital of the Chichester Gas Company are among the objects of a Special Order for which that Company intends to apply to the Board of Trade under the Gas Undertakings Acts, 1920 to 1934.

"**Co-Partnership,**" the quarterly organ of the Industrial Co-partnership Association, in its issue just published opens with the Editor's comments on recent developments of the co-partnership principle in the Birmingham district and elsewhere. Mr. Stanley J. Benham's story of the family business of Benham & Sons "Under Five Generations" is reviewed.

The Tender of Messrs. Westwood & Wrights, Ltd., Brierley Hill, for the provision of four new purifiers at the gas-works has been accepted by the Stourbridge Town Council. Councillor J. A. Mobberley (Chairman of the Gas Committee) stated that the Ministry of Health, in sanctioning the necessary loan, agreed that the work should be put in hand at once. Two of the present purifiers, he said, were sixty years old.

A Very Successful Exhibition and cookery demonstrations have just concluded at Farnham. This Exhibition ran for five days during which over one thousand people attended. A cake-baking competition attracted 200 entrants. There was a good display of Richmonds' "Bungalow" "New World" cookers, High "Beam" fires, together with their "Equator," "Newlyn," and "Don" water heaters, all of which attracted considerable interest and a gratifying volume of business, with many encouraging enquiries now being followed up. The effort has undoubtedly given a definite impetus to the local interest in domestic gas equipment.

Presentation to Mr. H. James Yates

It was mentioned in last week's "JOURNAL" that at the Annual Meeting of Radiation Limited, Mr. C. Herbert Smith presented, on behalf of the Board, an oil painting of Mr. H. James Yates, to be placed in the Board Room, as a mark of appreciation from the Directors of Mr. Yates' valuable services to the Company as Chairman and Managing Director. The Board presented to Mr. Yates a replica of this painting, a photograph of which is reproduced above.

Women's Gas Council

Manchester's "Home Tidings"

An early arrival among Coronation Souvenir numbers is the March issue of *Home Tidings*, the magazine of the Manchester Branch of the W.G.C. We do not pretend to possess prophetic genius, but surely its good taste and interesting reading matter have set a high standard for subsequent publications of this nature.

The first pages are naturally devoted to the Royal Family; there are two full-page portraits of Their Majesties, a family group with Their Royal Highnesses the Princesses Elizabeth and Margaret Rose, and a full-page portrait of Princess Elizabeth alone. A brief description of the Coronation ceremony is given together with an illustrated article on the Princess Elizabeth Gift House which should greatly appeal to the ladies. There follows a foreword by The Rt. Hon. J. R. Clynes, M.P., J.P., D.C.L., former Home Secretary, who observes that gas is one of the few modern agencies which can give an arresting variety of service in the domestic, industrial, and social life of the country, and that it can truly be said that in every household Mr. Therm is in the best sense of the term a paying and serviceable guest. Among the interesting articles in *Home Tidings* are contributions by Miss Rosemary Andree, Britain's Venus, on that highly topical subject, health and beauty, and Mr. T. Bowen Partington, F.I.L., F.R.E.S., in the third of the series on how to keep fit.

The South Metropolitan Company's

Street Lighting Improvements IN Lambeth

An account was given in last week's "JOURNAL" of the official inauguration by the Mayor of Lambeth of extensive street lighting improvements in the Borough. The accompanying photographs give a good idea of the excellent results obtained by the use of the South Metropolitan Company's well-known "Supervia" lamps. The upper illustration shows the high-pressure Class E illumination in Tulse Hill, while the lower photograph, of Leander Road, is typical of the low-pressure Class F lighting which is being adopted in the side roads. The new high-pressure lighting involves an additional 8¾ miles of streets, while the side street lighting is being replaced by 70 miles of low-pressure lamps.

The Society of British Gas Industries

Juniors Awarded Silver Medals

The Council of the S.B.G.I. have again this year awarded Silver Medals to each of the Junior Gas Associations for the best Paper adjudged to have been presented during the year by their members at a General Meeting.

Below is a list of the awards:

London and Southern District Junior Gas Association.
J. GRAYSTON . . . . . Dec. 18, 1936
"Gas Law."

Manchester and District Junior Gas Association.
J. A. SPEERS . . . . . April 4, 1936
"The Control of Oxide Purification Plant.".

Midland Junior Gas Association.
D. W. G. SCOTT . . . . . Nov. 5, 1936
"Coke Treatment Plant."

Scottish Junior Gas Association (Western District).
C. A. POULSON . . . . . Nov. 14, 1936
"The Care and Maintenance of Waste-Heat Boilers."

Wales and Monmouthshire Junior Gas Association.
C. FULLER PETERSEN . . . . . Jan. 25, 1936
"The Manufacture and Treatment of Gas Coke with Particular Regard to its Sales and Use for Open Grate Purposes."

Western Junior Gas Association.
ARTHUR FACER . . . . . Oct. 17, 1936
"Some Aspects of Unaccounted-for Gas in Relation to Modern Practice."

Yorkshire Junior Gas Association.
J. A. DERBYSHIRE . . . . . Dec. 12, 1936
"A Searchlight on the Economics of Gas Production."

1937 "JOURNAL" DIRECTORY

Page 18. CLITHEROE. R. Barrett retired.

Page 26. GAS LIGHT AND COKE. B. F. Wood appointed S., vice W. L. Galbraith, retired.

Page 46. MIDDLESBROUGH. J. W. Pallister appointed E. & M.

Page 62. SOUTH METROPOLITAN. F. Jones elected *Pres.*, vice Dr. Chas. Carpenter, resigned. E. V. Evans appointed G.M.; A. H. Andrews, C.E & W.M.; F. J. Bywater, Compt. & Dist. M.

Page 74. WHITBY. H. Galleway appointed S. & M., vice W. M. Galleway, retired.

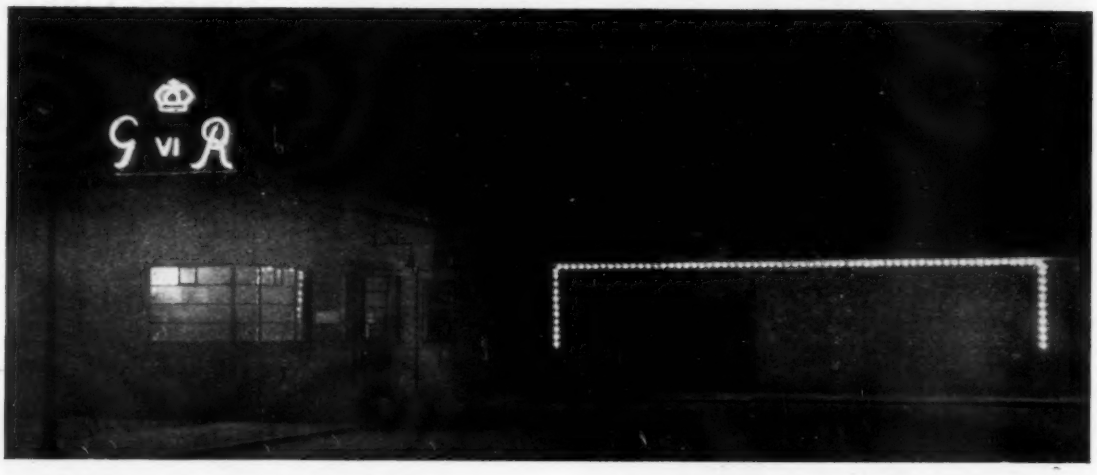
Page 86. KIRKCALDY. J. M. Dow appointed E. & M., vice J. Kincaid, retired.

Page 136. MALTA AND MEDITERRANEAN. C. F. Wright appointed M., and F. C. Ferguson, E, vice A. E. Buckley, E. & G. M., retired.

Page 141. LANCASHIRE FOUNDRY COKE CO. D. V. Hollingworth, M.

Page 141. LANCASHIRE STEEL CORPORATION. M. E. Nicklin, M.

A New Type of



A novel application of incandescent high-pressure gas lighting for ornamental illumination work which has been recently developed by the South Metropolitan Gas Company.

Ornamental Gas Lighting

The Industry has long been in need of some form of gas lighting for ornamental and display work whereby letters or signs may be produced on the same lines as those so simply effected by the ordinary electric lamp. One has only to visit Piccadilly Circus, or any other central areas in our large cities, to observe how the electric sign is fulfilling a prominent role in advertising and display work generally. True, the Gas Industry does not claim as yet to be able to produce complicated moving signs or multi-coloured figures; but that it is able to produce very effective illuminated letters for all kinds of display work and ornamental illuminations is borne out by an interesting new development by the South Metropolitan Gas Company which is illustrated in the accompanying photograph.

Briefly, the essential feature of the device is a combination of a high-pressure gas burner with an unusual type of gas mantle, which may be used without the need for protection from the weather. The simplification which results from dispensing with glassware enables brilliant signs and decorative effects to be obtained in a wide variety of forms.

Gas, at a pressure of approximately 80 in. W.G., is supplied to an ejector at the end of a burner tube, which may be made in any desired shape. The tube is fitted with a row of burner nozzles, and on each nozzle is screwed a specially prepared gas mantle, requiring 1 cu.ft. of gas per hour. These mantles are supplied in the unburned condition and are strengthened to withstand severe treatment. When first lighted each mantle shrinks rapidly and forms a small hemispherical source of light of great brilliancy. Straight or curved tubes are made into letters or designs, and when fitted with the mantles, two or three inches apart, form effective signs or strips for outlining architectural features. The cost of these special mantles is low, and their average life is over one hundred hours. They are constructed to withstand all normal conditions of weather, and are unaffected by rain.

The Coronation design illustrated on the left of the above photograph is fitted with two hundred and forty mantles, and gives a light exceeding that of ten thousand candles.

This device, which has been provisionally protected, will be used on several sites in London during the Coronation Illuminations.

Cannon's New Season's List

"Autimo" Controlled Cookers

The colourful new season's list of the Cannon Iron Foundries, Ltd., Deepfields, Bilston, fully maintains the high standard set by former publications of this nature. The layout is extremely tasteful, with its preponderance of primrose with dark and light greens, and bold type is used to good effect on art paper,

A feature of the catalogue is the "Autimo" oven heat controller which automatically regulates the exact amount of heat required for any cooking operation. Then are described the Firm's various cookers including the "Champion" which it is claimed embodies features entirely new in cooker construction, the "New Challenge," an up-to-date and very popular cooker which the manufacturers state is highly efficient in use and economical in gas consumption, and the "Suburban," a high-grade cooker with specially constructed bottom flue oven.

The "Champion Centenary" and "Centenary" are high-level cookers of attractive design in which the crown plate, cast in one piece, is finished in the very serviceable "Porceliron" mottle enamelled finish; all taps are chromium-plated. Other models in "Porceliron" mottle enamelled finish are the "Oxford," "Cambridge," and "Cottage." A sturdy model is the "Hercules," which is designed for special requirements. The publication is concluded with descriptions of the "Ideal" plate racks, hotplates, grillers, pikelet or muffin plates, irons, wash boilers, water heaters, and boiling burners.

Scottish Western Juniors

Annual General Meeting

The Annual General Meeting of the Scottish Junior Gas Association (Western District) was held at the Royal Technical College, Glasgow, on Saturday, March 27, when Mr. J. Webster, President, presided.

The annual report was adopted, together with the financial statement.

Officers were then elected for the ensuing season as follows:

President.—Mr. R. A. MacLaren (Newton-on-Ayr).

Vice-President.—Mr. N. C. Sturrock (Greenock).

Hon. Secretary and Treasurer.—Mr. W. Kirk (Motherwell).

Council.—Messrs. K. Graham (Glasgow), W. A. Currie (Renfrew), J. Bateman (Kilmarnock), J. K. Campbell (Glasgow), S. Davies (Alexandria), and J. Webster (Port Glasgow), *ex-officio*. (Retire 1938.) Messrs. D. Lambie (Coatbridge), E. G. Smith (Dumbarton), W. Gledhill (Stirling), and A. Shand (Falkirk). (Retire in 1939.)

Coming-of-Age Ideal Home Exhibition Shows Gas Service In Its Most Up-to-Date Form

Interesting Displays at Olympia

The "Daily Mail" Ideal Home Exhibition, recognized as the most popular and comprehensive domestic exhibition organized for the British public, provides a splendid opportunity for demonstrating the pre-eminence of gas for all the essential household services. Through the good offices of the Gas Light and Coke Company and many leading appliance manufacturers, this 21st Ideal Home Exhibition puts the full story of modern gas service across in a most convincing manner, while it is also of particular interest to the "gas man" by reason of the many new and improved appliances to be seen for the first time. It is impossible to deal by any means fully with the excellent displays of the gas exhibitors; but an endeavour has been made in the following pages to give an impression of the various stands and "side shows," with special reference to novel exhibits which show forth gas in its most up-to-date form at Olympia.

The gas manufacturing and supply side of the Industry is represented by the Gas Light and Coke Company, round whose very fine stand in the Grand Hall most of the appliance makers' displays are grouped. As is to be expected, the Company's exhibit embraces every phase of domestic gas service from gadgets and portable appliances to the largest household gas ranges and refrigerators. In addition to sections which are devoted to the latest coloured fires and cookers, special attention is paid to water heating, and a range of heaters—both instantaneous and storage—is grouped in an alcove above a stainless steel trough, adjacent to which is an example of the gas circulator as a useful adjunct to the coke boiler. The whole layout and colour scheme of the stand is very attractive, good use being made of niches in the outside walls of the stand for the display of various smaller appliances.

The most striking feature of the whole display, however, is undoubtedly the series of moving tableaux arranged at the end of the stand abutting upon the main aisle. This exhibit is devoted to "Ascot" gas water heaters and takes the form of three different settings on a revolving circular platform. One setting shows a number of "Ascot" sink heaters pleasingly arranged on a back panel with appropriate slogans. Then comes a bathroom scene, showing the heater in operation above a handbasin, and accompanied by a lady demonstrator (in suitable negligé) who explains and operates the heater. Finally, a kitchen scene comes to the front, and again a suitably attired demonstrator shows how the unpleasant business of washing up can be made so much less trying with the aid of plenty of hot water so easily obtained from the sink water heater. This series of living scenes is a splendid idea and is certainly attracting a great deal of attention. It is not, of course, disclosed to the onlooker how the revolving stage mechanism works; but, as we're all in the business, we suggest that gas men visiting the Exhibition pass round the hat for the fellow who turns the handle at the back!

The Gas Light and Coke Company have also arranged a series of excellent displays on the Empire Hall First Floor section which is called the "Piccaninny Circus." Here Mr. Therm is teaching home service, and the displays consist of complete gas installations in a model kitchen, a one-room flat, and a model laundry. Continuous demonstrations of cookery and laundry work are proceeding, given by competent demonstrators who are assisted by young girls. In the kitchen, which was designed by Mrs. Darcy Braddell, is an "Ascot" sink water heater and, of course, a gas refrigerator. In the one-room flat, too, it is shown how gas appliances provide the simplest equipment—a Flavel's "Elf" cooker and small refrigerator in a combined setting, a "Portcullis" built-in panel fire, and one of the new "Hotmeal" cooking cabinets. The last-named is an interesting little appliance marketed by Cookers and Geysers, Ltd.; it is a gas cooker that can be left cooking all day without attention; it can stew, braise, and simmer, is externally heated, hermetically sealed, and is fitted with a thermostat. One cannot roast in the cabinet, but one *can* heat up cold meat and keep it in perfect condition until mealtime. In effect, it is a super hotcloset whose steamy heat prevents meat from getting dry and ensures that vegetables remain a good colour. There is ample space for three or four casseroles (all cooking must be done in covered dishes), and a whole meal such as stewed steak, potatoes, stewed fruit, and creamed rice could be cooked at the same time. The cooking must, however, be really well started before the "Hotmeal" is brought into use. In appearance, the cabinet is very much like a small refrigerator and should have many useful applications.

The equipment for the laundry demonstrations includes an "Ascot" multi-point heater, gas wash boiler, drying cabinet, and, of course, the gas iron.

Many Interesting Displays.

To review briefly the displays of the appliance manufacturers, there is much of interest in the way of kitchen equipment to be seen on the stand of Benham & Sons, Ltd., including examples of their special sinks, drainers, plate racks, &c.

Bratt Colbran, Ltd., are, as usual, showing in a very effective way that the heating unit alone does not make a

One of the Water Heating Tableaux shown by the Gas Light and Coke Company on the revolving stage which forms part of their Stand.

fireplace. Some truly beautiful settings into which the well-known "Portcullis" gas fire harmonizes most admirably bear out this theory, and in this direction pride of place must be given to a magnificent fireplace in which a "Portrush" 4-unit fire in rustless steel finish is set in a surround of Algerian Onyx Marble on a hearth of similar

material with a stepped raiser of black marble; around the whole is a mantel in three shades of blue, mirror with backboard of ebonized hardwood edging, and plinths. No description can do justice to the beauty of this gas fireplace. Other designs for gas fire settings include a useful mantel which embodies small cupboards and bookshelves.

Among further gas fires of interest on the Bratt Colbran stand are the " Sandown " Major, which is provided with a concealed boiling burner in the top of the fire, and the " Lancaster " fire, which has been designed to fit into existing coal fireplaces without breaking the lines of the frame or tiled surround. The automatic lighting mechanism is demonstrated by means of an exposed unit, while examples of the firm's overhead radiant panels show another useful form of gas service; portable fires and radiators are also to be seen, while an interesting departure by this concern is the " Portcullis " gas-ignited coke fire, which has been produced in response to a demand for a high-efficiency coke grate on the lines of the well-known " Heaped " fire.

Another interesting exhibit on this stand is a special treatment of the " Nocturn " portable gas heater, whereby the stainless steel back reflector has been extended upwards and the whole set in a panel surround for inset purposes, thus making a neat and effective installation for a small room, giving the appearance of an ordinary fireplace though there need actually be no flue.

A view of the spacious interior of the Gas Light and Coke Company's Stand.

A range of vacuum cleaners for various purposes is displayed by the British Vacuum Cleaner and Engineering Company, Ltd., who also make machines for industrial cleaning.

A New Cooker.

An exhibit on the stand of Cannon Ironfoundries, Ltd., which immediately attracts attention is their new " Talbot " gas cooker, which incorporates an alarm clock in the centre of the white enamel backplate—the idea being, of course, to call the cook when it is time to remove a dish from the oven. Apart from this novel feature, however, the " Talbot " has many other interesting points, not least of which are the exceedingly attractive lines, with few protrusions to break the neat straight surfaces. The oven tap and " Autimo " control are recessed, while the taps controlling the hotplate are of the " drop " pattern and only show when in the " on " position; the grill burner has been brought to the front for greater accessibility, the air regulator being at the back, while it is controlled by an unusual form of push and pull tap. The design of the hotplate bars is also interesting in that recesses are introduced to carry away from the burners any liquids which boil over.

Examples of Cannon's well-known " V " inclined gas fires are in evidence—one of these, the " Virginia," is fitted not only with the firm's automatic flint lighter, but also with a " Duplex " burner operated from the same tap —thus giving two separate units of heat with one control. The " Beacon " radiator is also featured on this stand, and the whole display is effectively backed by a representation of the weapon from which the firm take their name.

Boilers and radiators for central heating and hot water supply are shown in various shapes and sizes by Crane, Ltd., the comprehensive range of the latter being supplemented by the firm's new " Concealed " radiator—an up-to-date type of hidden heating system.

On the stand of the Eagle Range and Grate Company, Ltd., is to be seen a comprehensive display of Eagle combination grates and gas coke grates. Various types of large scale cooking apparatus are shown in actual operation. A wide variety of gas-coke grates, fitted with gas burners to eliminate the use of paper or firewood in lighting is also shown, including an attractive design in the barless style. Another interesting exhibit is a combination grate for heating, cooking, and hot water supply from the one fire.

Refrigeration.

The fact that the gas refrigerator is becoming increasingly recognized as an essential piece of kitchen equipment is demonstrated by Easiwork, Ltd., who specialize in built-in kitchen fitments. Among these is shown an example of a gas refrigerator built into a composite setting of kitchen equipment. And this naturally brings us to the display of Electrolux, Ltd., whose stand occupies a prominent place in the refrigeration section. A striking display of all sizes of gas operated models for domestic and hotel purposes includes their latest L.750 cabinet of 7·5 cu.ft. capacity and L.1000 model of 10 cu.ft. capacity, with double doors. A new feature of some of the latest Electrolux cabinets is a simple push-handle mechanism combined with a spring release for easy opening of the doors, while some cabinets are now also being provided with locks. Of the two models referred to the maximum gas rate is stated to be 4·15 cu.ft. per hr.

A comprehensive range of instantaneous gas water heaters is to be seen on the stand of Ewart & Son, Ltd., multi-point models being represented by the " Califont " De Luxe and " Advance " heaters, which are built for hard wear; the outer casing is finished in white porcelain enamel and encloses all working parts. Other heaters for direct bath supply are also exhibited by this firm, while their new " Brilliant " for sink and lavatory basin purposes is an interesting model.

A development of the Flavel " Elf " cooker is to be seen on the stand of Sidney Flavel & Co., Ltd., in the Major model with de luxe finish. This new cooker is extremely attractive in its enamel finish and has a somewhat larger oven than its smaller brother; the waste products from the oven are directed through plate-warming chambers fitted with withdrawable wire plate carriers. Another pleasing gas cooker by this firm is their all-porcelain enamelled " Kabineat " which closes right up when not in use. Several of Flavel's cookers are fitted with very neat folding plate-racks which provide a useful table top. The stainless steel " Kitchen Grand " is another very fine cooker, which can also be closed up into a neat cabinet; this appliance has a 4-burner hotplate alongside which is a self-contained griller unit, while there is a special dish-warming compartment beside the main oven. All the taps on this cooker are of the drop-head safety type, while the automatic oven heat control embodies a bijou cooking chart.

On the space heating side are to be seen examples of the firm's attractive radiators, while a neat little panel gas fire is shown as a suggestion for building into bedroom walls at a higher level than the usual fireplace, thus avoiding the danger of scorching the foot of the bed in small rooms. This fire is called the " Retriever," and is fitted with reflectors. The gas log fire is, of course, in evidence, and an efficient gas-ignited coke fire attracts attention in the centre of the stand, this being supplied with new easy-fixing arrangements.

Caller Herrin' !

To-day, with our new and increased knowledge of the problems of nutrition, the herring is coming once more into its own; eminent doctors are urging us to make more use of this natural health food, and the Herring Industry Board are showing on their stand how, with the help of gas, a multitude of tasty dishes can be prepared from this not-so-humble fish. A gas cooker, water heater, and refrigerator are used to assist in the interesting demonstrations which are carried out.

A display of boilers and radiators for central heating and hot water supply is to be seen on the stand of Ideal Boilers and Radiators, Ltd., including " Ideal " gas boilers, the " Cookanheat " combined gas cooker and coke

boiler, and " Ideal " towel rails in chromium and nickel plated finish, together with other accessories.

Some interesting washing machines are displayed by the Jiffy Automatic Clothes Washer Company, Ltd., among the features of which is the instant water release.

A stand representative of every phase of gas heating, cooking, and water heating is that of R. & A. Main, Ltd., whose display is arranged on most artistic lines. One end of the stand is set apart for cookery demonstrations, which are held two or three times each day, while further interest is aroused by a cooker with a strange-looking oven door set up in a niche at the other end of the stand. Actually, this oven door is an ingenious little cinema screen, on to which a series of topical films, including " shots " of Mains' works, are projected periodically from behind.

Particularly striking is the water heating display—a series of Mains' well-known appliances, including their new instantaneous model—the " Pronto "—being set above a cascade of water backed by tinted glass which makes a very effective display in Coronation colours. The new " Pronto " is fitted with interlocking tap and is an efficient little heater. In addition to examples of storage heaters an interesting exhibit is a section showing the internal construction of the firm's circulator, which is also shown in position, connected up to the coke boiler supply. On the cooking side, the firm's popular " Sussex " is exhibited in a number of very pleasing designs and finishes—the blue and cream combination being particularly attractive. Among the features of this cooker are its easy cleaning, automatic oven control, and reversible grid shelves, providing an unusually wide variety of shelf spacings; the enamelled oven hangers or grid shelf supports are of new design, being slotted to take the grid shelves and themselves easily removable for cleaning. An example of the " Sussex " is shown fitted with a useful hotcloset in the place of the usual plate-rack.

A Portable Meter.

On the heating side, in addition to the well-known " Crichton " fire with its unique arrangement of curved radiants, examples are to be seen in a variety of coloured finishes of portable fires—one model showing the application of Glover's time clock " meter " for hotel and boarding house use. This little meter works—as its name implies—on a time basis, the insertion of a sixpence in the slot giving so many hours' supply according to the setting. It measures only a few inches cube and is intended for fitting to portable fires so that both fire and meter can be conveniently carried from room to room and plugged in as desired. The " Velomain " radiator is another interesting appliance, whose special construction keeps the back cool and projects the warmed air outwards from the top of the front; flickering luminous burners, backed by a reflector, give a pleasing effect.

Coloured water heaters to harmonize with all types of bathroom decoration are displayed by New Geysers (1931), Ltd., whose new large " Autofont " multi-point heater is an interesting development which gives increased output. Other gas water heaters on this stand include sink models, circulators, and appliances specially designed for use with Calor gas.

A Heating Service for the Home.

A comprehensive heating service for the home is represented by the appliances exhibited on the Parkinson Stove Company's stand. The " Renown " cooker, of course, occupies a prominent position, a model being mounted in section on a revolving platform to show the details of its construction; it may be mentioned that the " Renown " is now fitted with a " flash " lighter for the hotplate burners. There is an attractive water heater display which includes examples of the firm's, " Crystal," " Elan," multi-point, and circulator models, while on the space heating side a variety of attractive gas fires with automatic ignition include the well-known " Curvex " and " Super-Ray " series, together with " Paravex " and " Zonex " portable models. Various designs of the " Ubic " radiator are also in evidence, including a circular model.

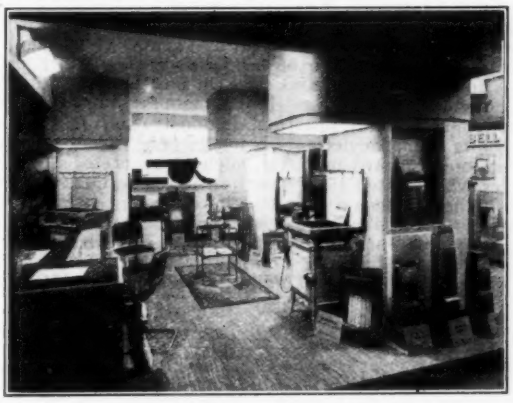
An interesting little appliance is Parkinson's combined gas griller and boiler, suitable for use on a small table, while another useful " gadget " is a development of the firm's " bowl " boiling burner in the form of an enamelled shelf fitting for fixing anywhere on a wall. A new type of grill fret is also being shown on a number of Parkinson cookers, while a suggestion for the gas kitchen is embodied in a neat arrangement of cooker, refrigerator, sink, and cupboards all built up in a composite unit.

A range of instantaneous gas water heaters is shown by the Pollard Engineering Company, Ltd., while for those interested in coke burning appliances there are a number of stoves and boilers to be seen on the stand of the Combustion Appliance Makers' Association.

Gas Central Heating and Hot Water Supply.

The principal idea underlying the display of Thomas Potterton (Heating Engineers), Ltd., is that gas-fired central heating on a large scale is prominent in the firm's mind at the present time, though heating systems for the smaller residence are not forgotten—as evidenced by a comprehensive range of apparatus for both central heating and direct hot water supply. One of the main features of the exhibit is a system of low-pressure water heating, fitted with remote control by means of an air thermostat and time switch with clock, thus demonstrating to the public the ease with which the temperatures may be adjusted to suit individual requirements—an important feature from the propaganda viewpoint.

As an example of domestic hot water supply, complete with heated towel rail, an " Emperor " thermal storage set is shown in operation, emphasizing the service which such a system affords in this connection. On the non-active side may be seen a range of three " Rex " boilers for central heating—Nos. 1, 2, and 3 series—having a capacity ranging from 66,000 to 1,250,000 B.Th.U. per hour. In the case of the No. 2 series " Rex " the casing and insulation of a boiler is cut away and a portion of the waterway omitted in order to expose the interior of the boiler and show the special features of its construction. Among these may be mentioned the accessible flue-ways, which offer sufficient resistance to avoid excess air and at the same time break up the core of the hot gases, thus quickly raising the water to a high temperature. The effect of this is to suppress condensation within the flue-ways and has been obtained by designing the cross tubes oval in shape with fins cast on to the under sides, which, in conjunction with the baffle plates, prevents straight egress of the products from the combustion chamber to the outlet and directs the hot gases over a very large heating surface.



The Display of Cannon Iron Foundries, Ltd.

Examples of " Rex " boilers are also exhibited for direct hot water supply, with which appliances easy access is provided to the interior. Available in five different sizes, these boilers range in capacity from 60,000 to 198,000 B.Th.U. per hr. For small duty work on the central heating side a No. 20 " Victor " heater is shown, this series being made in three sizes with output varying from 15,000 to 30,000 B.Th.U. per hr. For greenhouse, garage, and similar small applications, the firm's " Spiral " boiler is exhibited, this apparatus having an easily removable front plate for simple fixing without the necessity for a boiler enclosure. These heaters work over a wide range of capacities according to their size, while for larger duties " Victor " boilers are available for which portable enclosures can be provided.

Among other interesting exhibits on this stand are night valve and cut-off valve equipment, both of which are important adjuncts in the economical running of domestic hot water supplies for smaller residential properties, while examples of equipment for solid fuel are to be seen in the " Vogue " and " Domesticatum " coke boilers for hot water supply. Altogether Potterton's stand demonstrates very clearly the pre-eminence of gas as an automatic, trouble-free, clean, and labour-saving fuel for central heating and hot water supply from the largest block of offices to the smallest private dwelling.

For all Domestic Purposes.

A full range of gas appliances for all domestic purposes is to be seen on the Radiation stand, where an attraction to visitors is the practically non-stop cookery demonstrations. On the cooking side pride of place is, of course, given to the new " Rotary " cooker which has already been fully described in these columns. Many other " New

World " cookers are displayed, incorporating improved finishes; each of the Radiation Companies specializes in its own particular range of colour finishes so that altogether they offer a very pleasing choice that caters for every kitchen colour scheme. The Radiation gas match is shown on these cookers.

The six Radiation Companies have always made a special study of large-scale cooking equipment for hotels, restaurants, boarding houses, &c. A recent development in this type of cooker is the " Guesthouse " series, designed on a system of units by which one or two or any number can be assembled. In all cases the group is complete, but at the same time is capable of enlargement to meet the requirements from time to time. Each unit cooker is heated independently and the ovens are all fitted with " Regulo " control.

There is full exhibit of High " Beam " gas fires. Each of the Radiation Companies offer their own particular designs and finishes of this fire, the working parts, however, being standard, and with all the High " Beam " features. The new " Mardale " fire incorporates a useful boiling burner concealed in the canopy.

Water heaters suitable for all domestic requirements are to be seen under working conditions on the stand. Either storage or instantaneous types are available in white or cream porcelain enamel, or chromium plated finish. A new instantaneous heater is the " 97 " model, which takes up very little space and is fitted with a safety cut-off device in the event of the pilot becoming extinguished.

For Safe Fixing.

Those concerned with the fixing of gas appliances, particularly water heaters, will appreciate the important part played by the necessary bolts and plugs which hold the apparatus in position. For this reason the display of the Rawlplug Company, Ltd., is especially interesting to the technically minded, as in addition to the fibre Rawlplug, which was first introduced over twenty years ago, the Rawlplug Company are now manufacturing white bronze plugs for use in damp and exposed positions, and bolt fixing devices, known as bolt anchors and Rawlbolts. Throughout the day practical demonstrations in the use of Rawlplug fixing devices are being given. A bolt fixed with a Rawlbolt to hard material, such as concrete, stone, &c., proves when tested to destruction that the bolt will break before the expansion unit can be dislodged in any way—this may seem like an extravagant claim, but the Rawlplug Company are prepared to prove it. Other lines of interest on the Rawlplug Company's stand are " Durofix," the heat and waterproof adhesive, plastic wood (wood in putty form), and a fine range of " All Square " chromium bathroom fittings.

The Vulcan Stove Company, Ltd., are showing many interesting gas appliances, including cookers in various pleasing coloured finishes and incorporating glass oven doors of practically unbreakable construction and non-steaming design. Examples of the firm's gas fires are also in evidence on this stand.

The " Side Shows."

The part played by gas at the Ideal Home Exhibition is by no means finished when the displays of the individual manufacturers have been viewed. There are many interesting applications of gas to be seen in what may be termed the " side shows." And in that these special features form much of the real pulling power of the Exhibition, are talked of more freely in the Press and elsewhere generally, and are inspected with probably greater interest than any individual stand, they provide a splendid advertisement for gas.

We have already referred to the gas apparatus in the " Piccaninny Circus." Then there are " The Kitchens of the Nations," where the only two modern kitchens are all-gas, a particularly effective display being a whole range of gas appliances, including Easiwork cooker, refrigerator, sink heater, and Potterton " Rex " boiler, all in white enamel finish; in the second kitchen Flavel's " Kitchen Grand," water heater, and refrigerator form the equipment. Adjoining the kitchens is a most striking display of " Ascot " gas water heaters—a series of sink models discharging steaming hot water down orange-coloured cascades, while the whole background takes the form of a sheet of water running down a large glass panel with suitable captions visible through the sheet from behind.

In a feature entitled " Backgrounds for Beauty " an example of a suitable gas fire (a " Portcullis " panel model) is shown in the lounge, while a bowl heater serves the bathroom. There are, in addition, a considerable number of gas appliances in use for demonstration purposes on various stands—once more testifying to the popularity of gas where efficient and reliable heat is required.

Finally, the housing section, where gas appliances once again provide most of the essential domestic services in the majority of the model dwellings. It would serve no useful purpose to refer in detail to individual appliances; suffice it to record that a wide range of gas cooking, heating, refrigeration, water heating, and laundry apparatus are to be seen as part of the standard equipment of what may be regarded as the very latest types of British home—in itself a magnificent (and unsolicited) testimony for gas.

Trade Notes

" Brostrom " Thermostatically-Controlled Gas Iron.

The new improved model of the " Brostrom " thermostatically-controlled gas iron which was recently demonstrated to a representative of the " Gas Journal," is an appliance which should make a rapid appeal to the Sales Side of the Gas Industry and provide a further means of keeping the domestic and industrial users of such apparatus " up-to-date " with gas.

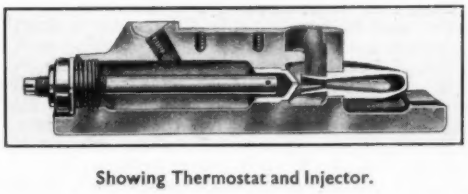
The " Brostrom " iron is easy to handle and work with; it is a well balanced appliance, being neither clumsy nor too heavy. The products of combustion and hot gases do not circulate round the hand of the user. The handle never gets too hot. It is a better ironing tool than the ordinary electric iron, as it is claimed more work can be done with a thermostatically-controlled iron in one hour than in two hours with an ordinary iron. The thermostat keeps the iron at the right temperature all the time. Even if left for a period the iron will be quite ready for use on return, and it will not be necessary to wait until it cools down. Another important claim for the " Brostrom " iron is that it will never light back.

The " Brostrom " iron is very economical because the thermostat keeps it at the most profitable temperature; no heat is wasted and only gas that is actually used is paid for. If a damp wash is to be ironed the heat input rises to meet the demand, and work can be proceeded with quickly. There is no waste of time waiting for the iron to get hot. On the other hand, it will not get too hot when lighter work is in hand.

The design of the " Brostrom " iron has been carefully thought out, and nothing has been sacrificed in efficiency, although a pleasing outward appearance has been produced. It is constructed on scientific lines and is the result of many years of research and experiment.

Its efficiency is, of course, chiefly due to the thermostat. It has been explained that only the temperatures above 100° C. are effective in evaporating moisture in damp clothing. Therefore an iron which works at 250° C. will evaporate as much moisture in one stroke as an iron working at 150° C. will do in three strokes, but, the firm add, only with a thermostat can 250° C. be used with safety.

The " Brostrom " Iron.



Showing Thermostat and Injector.

The consumption full on is 6 cu.ft. per hour, and 2 cu.ft. with maintaining flame. The " Brostrom " iron is manufactured by Vack Industries, Ltd., Mill Street, Kingston-on-Thames, Surrey.

London Juniors Visit Luton

An unusually large muster of members of the London and Southern District Junior Gas Association spent a most enjoyable day at Luton on March 31, when they made two works visit of exceptional interest—in the morning Electrolux, Ltd., and in the afternoon the Davis Gas Stove Company, Ltd. As hosts for the occasion, the two firms provided every facility for the visitors' enjoyment, which resulted in a day which will long be remembered by those who took part.

Guests of

Electrolux, Ltd.,

AND

The Davis Gas Stove Co., Ltd.

(Radiation, Ltd.)

The works of Electrolux—the largest and most up-to-date refrigerator factory in Europe—were described in some detail in the "GAS JOURNAL" as recently as March 17. It need only be mentioned again that the site of the works covers an area of 487,850 sq.ft., and that over 1,600 workpeople are employed in turning 115,000 ft. of tubing and 60 tons of sheet steel weekly into the gas refrigerator as we know it. The visitors evinced particular interest in the new continuous enamelling plant—the only one of its kind in Europe—which was illustrated in the issue of the "JOURNAL" just referred to. In the last two years the cost of extensions at the Electrolux works has amounted to over £300,000; the total length of conveyors is nearly 1½ miles, while the factory uses £9,000 worth of gas (84 million cu.ft.) in the course of a year's work. The acetylene welding plant is claimed to be the largest of its kind in the country, having a capacity of 400 welding points.

Entertained at Luncheon.

Following the inspection of the Electrolux works, the visitors were entertained at luncheon by the two firms jointly at the George Hotel, Luton, where, after the Loyal Toast had been honoured, Mr. CYRIL G. DAVIS (Director of the Davis Gas Stove Company) proposed the Toast of "The London and Southern District Junior Gas Association." In doing so, Mr. Davis said how delighted they were to have the Juniors with them on that occasion. He recalled that it was 32 years ago, under the Presidency of Capt. W. J. Liberty, when the Association first visited the Davis works, and the spirit of keenness which they had shown in those days had been maintained ever since. The manufacturers wanted to show members of the Gas Industry all they could in order to help them in their difficult task of pleasing the public, while they were also glad to have the opportunity of coming into contact with those engaged in the Industry in order that the manufacturers could learn what the public wanted. In conclusion, Mr. Davis expressed the Davis Gas Stove Company's sympathy in the Electrolux Company's recent fire.

The Toast was supported by Mr. J. H. R. HOMFRAY (Refrigerator Sales Manager, of Electrolux, Ltd.), who endorsed all that Mr. Davis had said and thanked him for his kind expression of sympathy in regard to the fire. From what the visitors had seen that morning he thought they would have gathered that the fire would not affect their deliveries of refrigerators in any way. Last year they had been in some difficulty in meeting orders promptly, but this year, despite the fire, they had plenty of refrigerators available in stock.

The PRESIDENT (Mr. R. Summerson, of Luton), in responding to the Toast, observed that he counted himself exceedingly fortunate in having been able to arrange this visit to Luton. The two works symbolized for them the all-gas kitchen, and the joint visit provided a valuable opportunity for emphasizing its importance. It was a matter for congratulation that the gas refrigerator had met with so much success, so that the most modern kitchen requirement—that of refrigeration—could best be supplied by gas. The success of the gas refrigerator could be judged by the fact that the Electrolux works were the largest refrigerator factory in Europe. The kitchen load, said Mr. Summerson, was of the greatest importance to the Gas Industry, and the part which the appliance makers must play in its retention for gas was no easy one. First of all, the cost of appliances must be reasonable; secondly, maintenance and servicing costs must be low; thirdly, efficiency must be high so that running costs would be low. In all three respects the gas appliance must compete successfully with its electrical counterpart. He was sure he was voicing the feelings of all the members of the Association when he said that they viewed the success of the work of the Davis Gas Stove Company and Electrolux, Ltd., with pride and admiration.

The members of the Association, went on the President, might be divided roughly into three groups—namely, (1) those who were engaged in gas manufacture, whose perpetual endeavour it was to produce gas of constant quality and combustion characteristics; (2) those who were concerned with the satisfactory distribution and supply of gas; and (3) those who were interested in the utilization of gas, with the thermal efficiency, durability, design, and operation of gas appliances. There must be many ways in which they could co-operate with the appliance manufacturers; they had yet to define what was the ideal gas quality; they had yet to standardize the performance tests of gas appliances; they had reached no finality in design. Wherever possible, let them co-operate. Their visit that day was, he felt, of the utmost value in enabling them to make personal contacts and see something of the appliance manufacturers' problems.

Finally, Mr. Summerson expressed the Association's very sincere thanks to the Davis Gas Stove Company and Electrolux, Ltd., for their kindness in permitting them to visit their works and for their generous hospitality which added so much to the pleasure of the visit. They appreciated very much the presence of Mr. Cyril G. Davis, Mr. Kenneth Davis, and Mr. Homfray, and they were greatly indebted to them for making the visit so enjoyable and informative. The production methods of those two firms were of the greatest interest to the members, and he was convinced that no finer works of their type could be found in this country.

Mr. KENNETH DAVIS drew attention to some of the things the visitors would be seeing in the course of the afternoon's inspection of the Davis works. So many factories, he said, were little more than assembly plants; but in the Davis works they would see the whole process of manufacture from the receipt

of the pig iron, through the casting, cleaning, painting, enamelling, and finishing processes to assembly and despatch. One of the difficulties with which they were faced was the necessity for coping with the Gas Industry's demands for all sorts of types of appliances, many of them varying only in very minor respects. There were very few gas undertakings which required exactly the same design of apparatus, with the result that the firm had to handle over 2,000 different types of cooker, while the total possible combinations of the various designs ran into a far larger figure. In order to overcome such difficulties they had to carry a stock of over 50,000 different piece parts.

The Davis Gas Stove Works.

Luncheon over, the Juniors gathered at the Diamond Foundry—as the works of the Davis Gas Stove Company are known locally—where they were taken on a thorough tour of inspection. First the offices were viewed, these being recent additions to the firm's Luton works, the visitors passing on to the drawing office and pattern shops, where designs for new appliances begin to take shape; frames for gas fires, for instance, are blocked out in wood and accurate measurements taken with a view to making the casting moulds; the laboratory where routine tests are carried out was also examined.

Next we come to the foundry—a vast building, covering 2½ acres, in which 240 men are constantly at work. The remarks of Mr. Kenneth Davis at luncheon, in reference to the large number of different parts which have to be made, provide one reason for the size of this building. The foundry is particularly interesting in that it shows under one roof examples of old and modern methods of casting—the floor method and the moving conveyor system, which latter the Company are hoping to extend in due course. The cupolas are situated at one end of the foundry, while there are also sand mixing and re-claiming plants. Common black treacle is used for mixing with the sand which is utilized for filling the cores of hollow castings, as the resulting material melts away at a certain temperature, leaving the required hollow core. Smaller parts for gas irons, burners, &c., are hand cast by girls in an adjoining room.

From the foundry the various castings pass to the buffing and cleaning departments, while subsequent processes include "pickling," drilling, and sorting for store. One of the hot pickling rooms reminds one somewhat of what used to be known as a "London particular," but we are assured that work is being actively, if invisibly, pursued therein. Small brass fittings and some of the heavier castings are received in bulk, but all other processes are carried through from start to finish at the Luton works. Sheet metal frames, &c., are stamped out on huge stamping machines, while the firm also have their own tool shop.

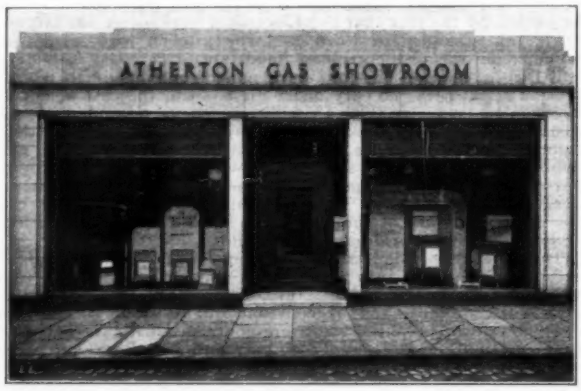
Then we come to the finishing shops, where such parts as require finishing are either painted or enamelled, followed by the usual stoving processes. A special shop is devoted to mottling, where girls produce the necessary mottled effect by means of an ordinary sponge. (We understand that once a year the Davis Gas Stove Company descend upon a local store and buy up their whole stock of bath sponges!)

Assembly.

The cooker assembly is carried out on a moving conveyor, and although it may at first sight look like mass-production methods, it is in fact nothing of the kind, for many different types of appliance are dealt with on the same conveyor. This means that the assemblers have to keep their wits about them, as no two consecutive cookers are necessarily alike—and it would never do to assemble an apple green cornice on to a grey mottled enamel body. The cookers are finally tested for gastightness before passing on for despatch, either by rail from the firm's own sidings or by road.

The Davis Gas Stove Company produce all their own enamels, an up-to-date plant being provided for the purpose. The enamel department is at the present time in process of extension, all of which is being carried out over existing shops without interference with other business. It is impossible to do justice in the space available to all the interesting processes which the Juniors witnessed at Luton, but it may be said that the greatest care and individual attention is devoted to each appliance turned out, every process being checked and examined periodically by a staff of "roving" works inspectors to ensure that there is no possibility of a falling-off in the quality or finish of any article produced.

At the conclusion of the tour of inspection the visitors were entertained at tea in the works canteen, and the party broke up at about 5.30 p.m., with many expressions of thanks to both Electrolux, Ltd., and the Davis Gas Stove Company for a most enjoyable day.



Atherton Gas Department open Attractive New Showroom

Our photographs show the new and spacious showrooms which the Atherton U.D.C. Gas Department have opened in Market Street, Atherton. The general lay-out and attractive interior decoration, for which the Gas and Water Manager, Mr. W. T. Duxbury, is responsible, has attracted much attention in the town. Any suggestion of crowding has been carefully avoided, and the modern "streamlined" fitments and the bright, carefully chosen colour scheme combine to produce a striking effect. This step forward not only makes possible a better and more comprehensive display of gas appliances, many of which are shown fitted and in operation, but is also consistent with the general progress which gas is making in the Atherton area.

Metering High-Pressure Supply

by
H. C. WIDLAKE,
A.M.Inst.Gas E., A.M.I.E.E., A.M.I.Mech.E.,
of the Plymouth and Stonehouse Gas Light and Coke Company

The metering of high-pressure supply is by no means a simple problem; and as it is to the high-pressure side that many undertakings must look for increased business, the need for accurate information is of increasing importance.

Quarterly summation of consumers' meter readings will give valuable and accurate information as to the respective percentages of gas sold on the high and the low pressure districts, but such information is not in a form that meets the needs of engineers who have to budget for extensions of compressing plant.

If information on this point is to be serviceable to both the estimating and the operating engineers it must give the shape of the daily load curve; in other words, it must be in a form which lends itself to the extraction of the plant load factor.

It is essential that information shall be available in the following form:

(1) Gas sent out over a given period.
(2) The maximum hour.
(3) The short duration peak within the maximum hour.

If these particulars can be tabulated in the form of daily load curves the statistics so obtained will be found to be invaluable in the running of the plant, in budgetting for extension to that plant, and in deciding the form which such extensions shall take.

With a steam-driven compressing plant run under throttle control to maintain either a level pressure line at a distant point or a pressure line (to furnished instructions) on the outlet of compressors, varying with the hour and the season, the gas " pulse " set up cannot be damped out. It exists in a varying degree according to the load, the capacities of the working compressors and their speeds, impairs the accuracy of any of the ordinary types of flow meters. It is in connection with such an installation that the Author proposes to describe the method he adopted for securing reasonably accurate and certainly consistent information in regard to flow and the shape of the load curve.

The plant consisted of four steam-driven compressing units, two of 38,000 cu.ft. per hr. capacity and two of 120,000 cu.ft. per hr. capacity. These units were rated for a final pressure of 25 lb. per sq.in. and were run at pressures varying between 5 and 15 lb. per sq.in. on the compressor outlets. A distant pressure indicator in the engine room furnished information as to the pressure at a four-mile distant key point, and the compressors, working either singly or in parallel, were throttle controlled to maintain a level 3 lb. per sq.in. at that key point.

The surge was, naturally, a variable factor, and was so pronounced that an attempt to meter the gas by one of the best types of flow meter on the market had proved a failure.

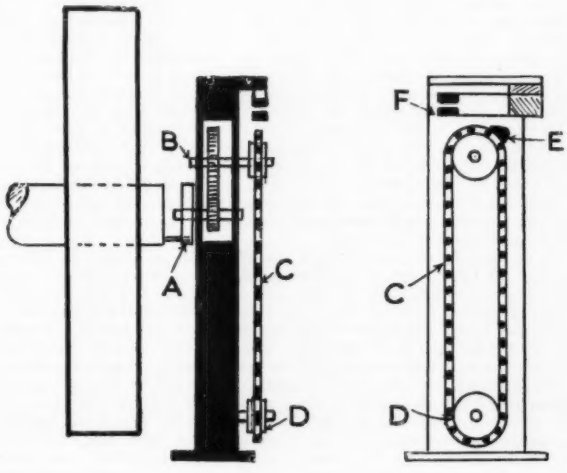
As an experimental measure ordinary cyclometers were fitted to each engine, and the readings obtained over a period were adjusted to factors connecting piston displacement and average pressure. The information so obtained naturally depended upon the condition of the compressor and the accuracy with which the average pressure was estimated, but the experiment was continued over a sufficient period to prove that the information obtained was consistent and accurate to within 2 to 3%. The result of this try-out with cyclometers on each engine was so satisfactory that it was decided to elaborate it into a summation system which should give the total output of the compressors in direct terms of cubic feet on a single dial, irrespective of how many compressors were working in parallel. Although this may suggest the need for somewhat complicated apparatus, it was actually secured in a very simple and inexpensive manner.

The motion of each compressor crankshaft was communicated to a small reduction gear of a ratio which provided for the making of a light electrical contact each time the compressors (under given conditions of outlet pressure) had passed 100 cu.ft. of gas.

Four such mechanisms were installed, one on each compressor, and the momentary contact made sent a 50 milliampère current through the windings of an electro magnetic counter common to the four contact mechanisms. Each electrical impulse transmitted to the counter caused the unit dial to move forward, and the difference in the logged readings multiplied by 100 gave the gas sent out over a given period. The information so obtained, regularly entered on the engine room log sheet as follows:

Time.	Index.	Diff. × 100.	Equivalent Rate per Hour. Cu Ft.
11.50	77 37	..	..
11.55	77717	8,000	96,000
Noon	77812	9 500	114,000
12.05	77919	10,700	128,400
12.10	78019	10,000	120,000
12.15	78129	11 000	132 000
12.20	78259	13,000	156,000
12.25	78399	14,000	168,000
12.30	78516	11,700	140,400
	&c., &c.		

It will be noted that the device is simply a cylinder displacement integrator corrected to the average working pressure, and that the degree of accuracy obtained depends upon the proper assessment of that average pressure. This figure would vary seasonally, and also with an increasing demand, and at infrequent intervals would require to be re-assessed. At such intervals the transmitting mechanisms may be left undisturbed, and the adjustment made by applying a factor to each of the readings, or alternately the gear ratio of the mechanisms may themselves be altered.



These mechanisms are shown in detail in the illustration. They consist of a spindle fitted with a slotted crank (A) lined up concentrically with the compressor crankshaft and driven by a peg tapped into the end of that shaft. A light spur gear drives a second motion shaft, (B), and a small pitch chain drive (C) is worked from the end of that shaft. The bottom sprocket (D) is adjustable and allows of the length of the chain being altered. The chain itself is fitted with a special cam link (E) for the purpose of lifting the electrical contact arm (F), and it will be noted that the contact is made once every circuit of the chain, and also that at any given speed the number of contacts made per minute can be varied by altering the length of the chain.

This design permits of an alteration in the average working pressure factor being effected mechanically by either reducing or increasing the number of links in the chain.

The exact length of the contact period depends upon the shape of the cam (E), and this is shaped as steeply as is possible to ensure a short contact period consistent with a smooth lift of the arm (F).

The limiting of the contact period to a minimum has an important bearing upon the chief factor which can impair

consistent integration—namely, the likelihood of two running compressors making contact at the same moment and so causing a loss of 100 cu.ft. of gas to the integrator. The mathematical possibility of this happening varies with the steepness of the cam. The easier the contour of the cam the longer will be the contact period and the greater the likelihood of two impulses being merged into one integration. In actual working, with fairly steep cams, such a condition of synchronism has never been detected over long periods of close observation when two units have been working in parallel.

The current for working this device is taken from the works power supply system and is resistance regulated to furnish the minute current to operate the counter magnet.

The Author's thanks are due to Mr. R. J. H. Clark, Chief Engineer of the Plymouth and Stonehouse Gas Light and Coke Company, by whose courteous permission the above article is published.

London and Southern District Junior Gas Association

General Debate Evening

Two subjects of considerable interest to the Industry were discussed by the London and Southern District Junior Gas Association at a meeting held at the London School of Hygiene and Tropical Medicine on Friday, March 19—the PRESIDENT (Mr. R. Summerson, of Luton) presiding. We publish below a report of one of the debates ; the other, which concerned the use of copper or lead and iron pipe for services and carcassing, will be dealt with in a subsequent issue.

IS THE GAS ENGINE OBSOLETE?

The Case for the Gas Engine.

Mr. G. A. C. Hill (Croydon) opened the case for the gas engine, remarking that there was a big field for town gas as a prime mover in industry, but only if its uses and advantages were thoroughly understood and clearly stated. The modern single-cylinder and multi-cylinder vertical engines operated by town gas were of compact design and, b.h.p. for b.h.p., frequently took less room than A.C. electric motors with their ancillary switch gear. The question of cooling the engine was of comparatively minor import in regard to space, inasmuch as if cooling tanks were utilized they could be housed outside the building, or tanks could be entirely dispensed with by adopting the continuous run-through system of cooling. The latter system was indeed preferable, because the water flow could be adjusted to result in the ideal operating temperature of 130° F. to 140° F., irrespective of engine load. By this means excessive cooling and the consequent formation of condensation in the silencer were obviated, the engine operation improved, and maintenance decreased.

It would not be right, went on Mr. Hill, to state the case in favour of town gas as a source of motive power without laying the bogey of difficulty of starting. Modern small engines were usually fitted with an impulse attachment to the magneto to increase the revolutions of the magneto at low speeds in order to facilitate quicker starting, whereas the larger types had incorporated on them either an air pump or an electrical starter.

Perhaps two of the biggest points in favour of the gas engine were the low maintenance costs and small attendance required. In common with every other form of engine, a certain amount of maintenance was necessary, and it had been Mr. Hill's experience that the following periodical attention had been adequate to keep the engine in thoroughly sound condition. The frequency of attention must necessarily vary with the type and size of engine and the number of running hours per day.

(*a*) Inspection of all bearings and taking up where necessary.
(*b*) Decarbonizing, including thoroughly grinding-in valves and inspection and adjustment of ignition equipment.
(*c*) Inspection of piston rings for wear and renewal of rings if necessary.
(*d*) Clearance of cooling pipe lines in order to ensure free circulation and inspection of water level in cooling tank (if not cooled by run-through system).
(*e*) Inspection of exhaust pipe and silencer and clearance of same, if necessary.
(*f*) At each inspection examine foundation bolts for tightness.

In addition to the above points, which must be given attention at every call, the valve and diaphragm of the anti-fluctuator must be cleaned and adjusted once per annum.

This maintenance was the essence of successful gas engine operation, and it was only by adopting such a scheme that the gas engine could develop in the future through successful operation in the past. As to the question of attendance already referred to, all that was necessary was the replenishment of the oil of the cylinder and big-end lubricators before starting in the morning and again at the mid-day break. The only other point of lubrication on these engines was the main bearing, which normally only required weekly attention. These remarks only applied to the small types of engines, as lubrication of the larger sizes was automatic.

Reliability was, of course, essential in industry if lost time and profits were to be avoided, and if it were only on this account the use of the gas engine more than outweighed the somewhat problematical advantages of its rivals. Apart from this question of maintenance, reliability, ease of starting, &c., which were inherent advantages of the gas engine, it must be remembered that the heat of the exhaust gases from large engines represents potential saving in fuel if advantage were taken of this fact by the user. Heat could be recovered for steam raising, water heating, oven heating, &c., and the application of the exhaust gases to these processes represented definite saving in the fuel bill.

Although running costs were not always of primary importance, they did represent a large factor in determining the installation of a source of power, and in this direction the installation of a gas engine could often show an economy over alternative fuels. Of course, the cost per b.h.p. hr. would vary with the size of the engine, its load and the running hours per week; but a fair figure to take, say, for a 40-b.h.p. engine working 50 hr. per week with gas at 6·8d. per therm, would be 0·97d. per b.h.p. hr., including 11 pints of lubrication oil per week at 3s. per gallon. If, however, this was coupled to an electric generator, then the cost (for maximum load) would be 1½d. per unit. These figures were, of course, only for one particular case, but served to show the approximate cost per b.h.p. hr. and per unit.

Given a straightforward tariff without provisos as to the times when energy was to be used and without excessive rates if used outside limited times, and considering the advantages of the gas engine as regards convenience and reliability, together with low running costs, then Mr. Hill maintained that if they instilled some enthusiasm into, and made themselves thoroughly familiar with, the use of town gas for motive power, then, so far from losing business, they would steadily increase it.

Against the Gas Engine.

Mr. A. L. Witt (Gas Light and Coke Company) opposed, and suggested that the gas engine was obsolete. In considering the question of the relative positions occupied by gas, oil, and electricity for power, he observed, it was obvious that apart from the consideration of fuel costs they also had to bear in mind the aspects of convenience and the nature of the work. In cases where a small amount of power was required at long intervals and where machinery was scattered and intermittent power desired it was agreed that the electric motor had definite advantages. Again, the electric motor had advantages where machinery had to be raised and lowered, calling for a portable source of power.

Generally speaking, however, it was the oil engine against which they had to compete, and Mr. Witt believed that the comparison here was essentially a question of fuel costs per b.h.p., considerations of thermal efficiency, maintenance costs, and space being unimportant. The gas and oil engine were approximately similar in these respects. A well-known firm manufacturing both types of engine had kindly furnished him with data compiled from investigation of actual installations

which enabled a fair comparison to be arrived at. Mr. Witt went on to quote these:

30	b.h.p. oil engine constant at 900 r.p.m. (including fuel, lubricating oil, interest, insurance, maintenance, and depreciation	0·377d	per b.h.p.
40·5	b.h.p. gas engine constant at 800 r.p.m. .	0·86d.	,,
165	b.h.p. oil ,, ,, ,, 428 ,, .	0·336d.	,,
165	b.h.p. gas ,, ,, ,, 428 ,, .	0·715d.	,,
220	b.h.p. oil ,, ,, ,, 428 ,, .	0·331d.	,,
220	b.h.p. gas ,, ,, ,, 428 ,, .	0·709d.	,,

[In the examples cited the price of gas was taken at 6d. per therm and oil at 5½d. per gallon; lubricating oil was taken at 3s. per gallon in each case.]

From these comparisons, observed Mr. Witt, it appeared that by supplying gas at 5d. or 6d. per therm gas could not compete with the oil engine, and he suggested that if they were to maintain and increase their power load they must substantially reduce the price of gas for this purpose—say, to 3d. per therm.

Discussion.

A point particularly stressed was that the oil engine was dependent upon a foreign commodity, whereas the gas engine operated on a home-produced fuel. It was emphasized that it was up to the Industry to ensure that the gas engine did not become obsolete, and the adoption of a multi-cylinder engine would help in this direction, giving a smoother supply and also obviating the necessity of a large flywheel. One of the principal disadvantages of the gas engine, it was stated, was that line shafting was a thing of the past; manufacturing processes called more and more for independent drives to each machine—a thing which the gas engine could not provide. Nor could they compete with oil on the score of cost. The Industry must therefore do its best to produce another type of power; the gas turbine, for instance, was a thermo-dynamic possibility which could provide small units which were adaptable. The truth of the matter was that the gas engine should be used to generate electricity to provide the independent drives. The gas engine was extremely efficient in this respect.

Another member pointed out that the question of electrical power in factories was usually linked up with the lighting, which was obtained much cheaper by reason of the power load. The adoption of gas engines in such circumstances would lead to increased lighting costs, so that the question of providing gas lighting for factories was an important point in considering the use of gas for power. Such systems of charge enabled electricity undertakings to obtain an unfair advantage over the suppliers of other means of power. An alternative was the installation of a gas engine to generate the electricity for lighting. The advantage of gas from the viewpoint of storage was another point mentioned; this might have an important bearing in certain circumstances.

The danger of having to use a gas engine on the gas-works at a time when the holder might be low was also mentioned. In reply to the observation regarding the use of a foreign fuel, it was remarked that diesel oil was now being produced in this country, and there was no reason why its production should not be extended.

A vote of thanks to the proposer and opposer in each debate was accorded on the proposition of Mr. R. N. LeFevre (Gas Light and Coke Company), the Senior Vice-President, seconded by Mr. S. C. Waldock (Gas Light and Coke Company), the Junior Vice-President.

COKE SALESMEN'S CIRCLE

A DISCUSSION ON

Modern Coke Fires

by
Dr. F. J. EATON
(of the Gas Light & Coke Company)

From a Paper presented to the Circle at a meeting held at Gas Industry House on Wednesday, March 17—Mr. J. GRAYSTON (Chairman of the Circle) presiding.

About two years ago a change was made from the atmospheric to the luminous flame gas ignition burner. Tests made at that time indicated that, providing the burners were correctly designed, both types were equally efficient. For each fire and burner there is an optimum gas rate, and it is therefore as necessary with a coke fire as it is with gas appliances to fix some form of volume control. In the method of fixing coke fires which we have adopted, the volume control takes the form of a restricter which is incorporated in the drop fan union cock.

Since the efficiency of both types of burners is the same, we decided to adopt the luminous flame in preference to the atmospheric burner. The advantages of the luminous burner are, first, that it is stable, whereas the atmospheric burner may light back when it becomes heated by the fire; and secondly, the luminous burner has to be fixed further from grate level and is therefore more accessible. Careful observations have been made to discover whether the gas ports in the luminous burner becomes blocked with dust, but no difficulties of this type have been experienced.

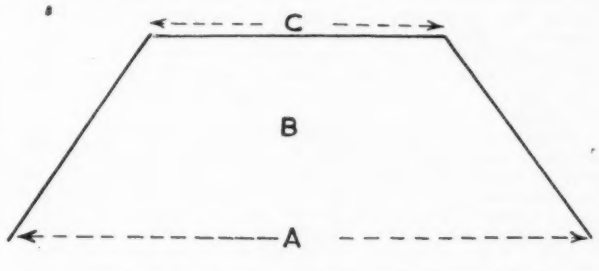
With both types of ignition burner it is essential that the burner should be firmly located and that the correct position of the burner should be clearly marked. In a luminous burner it is usual to provide one gas jet for each alternate fire bar space and to adjust the distance of the burner from grate level and the angle of the burner tube so that the flame passes through the firebar air space halfway between the front and back of the grate. It is usual to have a gas rate of approximately 3 cu.ft. per inch of fire width, and a convenient method is to adjust the length of the gas flame to approximately 9 in.

Where the ignition burner is provided with one gas port for each firebar air space the length of flame should be adjusted to 6 in.

Mention should here be made of the best method of lighting a coke fire. It seems to be generally assumed that the longer the gas burner is alight the more quickly the fire will reach its maximum intensity. This is incorrect, and it cannot be too strongly emphasized that the time taken to obtain a good fire cannot be reduced by keeping the ignition burner on for a period exceeding 15 to 20 minutes. With coke having a C.A.B. of 0·06 and an ignition temperature of approximately 500° C., a good fire with flames on the upper surface of the coke cannot be obtained in less than 45 minutes, while 60 minutes from the lighting of the ignition burner are required before the fire is at its maximum intensity. To obtain the best results the fire should be cleared of fine ash and completely filled with coke before lighting the burner. It is of advantage as well as convenient to leave the unburnt fuel in the grate.

Firebricks.

The introduction of the inset coke fire which can be fitted to existing brick insulation has made it necessary to make the grate bottom adjustable. Unfortunately, although the firebricks installed in modern houses are known as the Milner Standard, the dimensions vary slightly from one maker to another. The sizes of bricks usually installed are as follows:

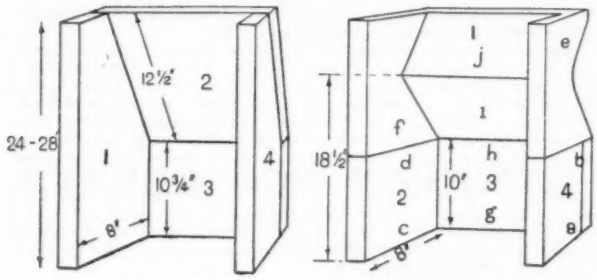


Size of Opening.	A	B	C
	In.	In.	In.
12 in.	11⅛–12	6½–7⅛	6⅛– 6⅜
14 ,,	13⅛–14	6½–7⅛	8⅛– 8⅜
16 ,,	15⅛–16	6½–7⅛	10⅛–10⅜
18 ,,	17⅜–18	6½–7⅛	12⅛–12⅜

In general the dimensions of the coke fire grates fall within the above limits.

When the existing brick insulation is faulty by reason of

cracks or insufficient thickness, or the existing brick is of the wrong shape, new brick insulation should be fitted. Two common types of brick are shown in the illustration. Both are four-piece bricks but whereas type "B" has a chair-back brick, type "A" is composed entirely of flat



bricks. The temperatures attained at various points of the "B" type brick are as follows:

Position	a.	b.	c.	d.	e.
Temperature ° C., 1st series	405	590	855	770	125
,, ,, 2nd ,,	345	530	670	780	110

Position	f.	g.	h.	i.	j.
Temperature ° C., 1st series	120	420	1,225	305	165
,, ,, 2nd ,,	195	430	860	300	155

Both sets of readings were taken between 1 and 2 hr. after charging the fire and points a, b, and g are below grate level.

A refractory test in which an inch cube of the material is heated under a load of 1 lb. shows that the temperature of initial deformation varies from 1,200° C. to 1,300° C. Since even at this temperature contraction is small, the reason for failure is not the stresses set up due to the temperature of the coke fire but the stresses set up in the brick during manufacture. This view would explain why in practice one set of bricks will fracture in a very short time while another set of bricks of the same make will last for years. These points have been taken up with the manufacturers, and we are co-operating with them in trying to improve the reliability of the firebricks. So far bricks machine made and of the shape type "A" appear to be the most reliable.

The chimney serves two functions: First, to carry away the products of combustion; and secondly, by its ventilating action, it causes a current of air to move across the top of the fuel, thus increasing the combustion rate.

No specially high draught is required to burn coke, and it is a good general rule that wherever a chimney has been satisfactory with a coal fire it will be satisfactory with a coke fire. Cases where the chimney is unsatisfactory can usually be traced to faulty design. For example, sudden changes in the cross-section of the chimney should be avoided. Thus, if a kitchener has been replaced with a coke fire, the opening at the back of the range should be bricked in to the normal size before the fire is installed. Alternatively, a cast-iron flue pipe can be run from the top of the chair-back firebrick well into the gather of the chimney. The cross-section of the chimney can be either the normal 9 in. square or as small as 6 in. diameter. In the latter case household refuse or any smoke-producing material likely to soot up the chimney should not be burnt on the fire.

Turning now to the question of the influence of the chimney and height of the fire opening on combustion rate, it has been found by experiment that a 16 in. fire set in firebricks but not connected to a chimney will, if charged every three hours, burn 1·7 lb. per hr. and 1·75 lb. per hr. if charged hourly. The same fire under an 18 ft., 9 in. by 9 in., chimney will burn 1·9 lb. per hr. if charged every three hours and 2·45 lb. per hr. if charged every hour. These figures show that the chimney has very little effect on the combustion rate when the bulk of fuel in the fire is low, and that the air necessary for combustion is obtained by the chimney action of the fuel bed itself. When, however, the fuel bed depth is increased, the air pulled over the top of the fire increases considerably the combustion rate. One very effective method, therefore, of controlling the combustion rate is to vary the depth of the fuel bed. The figures given refer to a fire opening 2 ft. high; if this is increased the possibility is that the effect on the combustion rate would be less.

With basket coke fires the combustion rate varies considerably according to the dimensions of the recess and also to the gather of the chimney. In general, a basket fire should not be fitted into a chimney opening which is more than 2 ft. 6 in. high. If the opening is higher than this then it is advisable to fit a blower.

The front of the basket fire must be behind the chimney opening, and this should be gathered into the 9 in. square chimney. Complaints of poor combustion in the case of basket fires can frequently be cured by fitting a metal hood over the fire at the level of the top of the recess.

All coke fires are now supplied with some attachment which ensures that once the fire has been fitted it will not move out of position. If this fitting is done carefully so that no air can pass to the under-side of the grate except through the hit and miss damper some control of combustion will be obtained. The degree of control varies with the make of fire and with the refuelling interval. Combustion rates of 2·05 lb. per hr. with the damper shut and 2·25 lb. per hr. with the damper open may be taken as typical figures for a 16 in. fire charged every three hours.

The ventilating effect depends upon the rate of combustion, area of cross-section, and height of chimney; and upon the restriction of the chimney opening. While it is important that there should be adequate ventilation in a room, it is felt that in many cases where coke fires are fitted, the air change is excessive and a draught results. This difficulty can be easily overcome by fitting a cast-iron plate over the top of the firebricks. It will be found that the combustion rate of the fire is not seriously affected, but the volume of air passing up the chimney is considerably reduced. In an experiment with a 16-in. fire which was connected to an 18 ft. 9 in. square chimney, it was found that with a 3-hourly charging interval the combustion rate was 1·9 lb. per hr. The area of the chimney at the top of the firebrick was 34 sq.in. By inserting a plate in the chimney this area was reduced to 18 sq.in. and the combustion rate was only reduced to 1·8 lb. per hr. The average content of carbon dioxide in the flue gases was 0·7% and 1·6%, while the flue gas temperatures were 125° F. and 180° F. respectively. If it is assumed that this fire is burning in a room of 2,000 cu.ft. capacity it can be calculated that the air change amounts to $3\frac{3}{4}$ per hr. when the chimney opening is 34 sq.in. and $1\frac{1}{2}$ per hr. when this is reduced to 18 sq.in.

The efficiency of the fire under the above conditions can readily be calculated. For a room of 2,000 cu.ft. capacity with two outside walls a heat output of 167 B.Th.U. per hr. is required for every degree Fahrenheit rise in temperature. For every additional air change a further 40 B.Th.U. per ° F. rise in the room temperature will be required. When the air change is $3\frac{3}{4}$ per hr. the increase in room temperature above the outside air temperature will be 21° F., and this will be increased to 38° F. when the air change is reduced to $1\frac{1}{2}$ per hr. Since the average winter air temperature may be taken as 44° F. the above figures show that by reducing the air change to $1\frac{1}{2}$ per hr. a room of 2,000 cu.ft. can be adequately heated by a 14-in. fire.

The above figures have been given to illustrate the importance of the size of the chimney opening upon the overall efficiency of the fire, and it should be clearly understood that the values given for air change only apply to the conditions under which the experiments were carried out. In practice the ventilating effect of chimneys serving coal or coke fires varies considerably. C. A. Masterman (I.G.E. Trans., 1935, No. 116, Table 13) gives values varying from 3·8 to 9·2 for a hot flue, while Dr. Fishenden ("GAS JOURNAL," 1920, 149, 758) states that by means of a chimney damper the air change can be reduced from 10 to 1 per hr. In considering air change it is important that this should be reduced only to minimize draughts and that at all times there should be adequate ventilation and the fire should clear its products of combustion. With regard to ventilation, Houghten, Yaglow, and others (Heating, Piping, and Air Conditioning, J.Am.Soc., H. & V. Eng., 1936, 65-76) give a figure of 9 to 12 cu.ft. of fresh air per person. In our example of $1\frac{1}{2}$ air changes, 5 people could be in the room and it would be adequately ventilated. It is suggested that many coke fires now installed give far too much ventilation and that better service would result if the chimney opening was reduced. In no case, however, should this opening be reduced to less than 18 sq.in.; otherwise there may be a possibility of products of combustion escaping into the room.

This type of fire is particularly popular where a cheap and efficient method of heating is required. The advantage of this type is that in addition to the radiant heat from the fire, radiated and convected heat is obtained from the casing. Tests show that this additional heat amounts to from 16 to 22% so that the overall efficiency reaches a figure of from 41 to 50%. Some 68 of these fires have recently been installed in a block of working-class flats and

they are proving very popular with the tenants. All the fires are fitted with gas ignition burners and the coke can be readily ignited with 8 to 12 cu.ft. of gas.

Wherever a register back boiler has been operated by a coal fire this can be replaced with a coke fire. It is important, however, to note that the higher temperature attained with coke makes it necessary to have the boiler descaled rather more frequently. With a boiler of dimensions 12 by 7 by 5 in. the maximum output to be expected is 9,000 B.Th.U. per hr. and the efficiency will be approximately 24%. In comparison with coal the higher efficiency obtained with coke compensates for the longer time taken in ignition, and hot water can be obtained with either fuel in approximately the same period of time.

In fixing a coke fire to a back boiler it is desirable that the bottom of the flue under the boiler should be about 1 in. above grate level. This tends to wedge the coke and prevent it falling into the space under the boiler.

The popularity of the coke fire is now firmly established, and there is every reason to believe that the sales of open fire coke will increase rapidly in the next few years. This increase is exemplified by the figures for the fires installed on the area of the Gas Light and Coke Company during the last three years. In 1934, 6,019 fires were installed; in 1935, 8,133; and in 1936 the number had increased to 11,305. At one time during the autumn of 1936 fires were being installed at the rate of 500 per week.

Discussion.

Mr. E. W. L. Nicol (Technical Adviser, London and Counties Coke Association), in opening the discussion, observed that everyone was acquainted with the difficulties attaching to fire bricks, which, as Dr. Eaton had shown, had to stand up to temperatures of over 1,000° C. He did not know of any other fuel which burned at that temperature in an open grate. It was bound to result in disintegration of both fire bars and fire bricks and render adequate control of combustion almost impossible. The cost of these fire bricks and fire bars in the first instance and in renewals was also a serious matter, and he maintained it was largely unnecessary. He was engaged at the present time in developing a coke fire on the brazier principle, with very little or no fire brick at all; and by enclosing the brazier underneath he hoped to obtain an added aeromotive force to that from the fuel bed itself. This would be of advantage from the viewpoint of more rapid ignition and in more accurate control of the air admitted under the fire. The brazier was now probably the correct principle on which to design coke fires having regard to the improved quality of gas coke. Coke fire design was tending to become stereotyped in general principles and he thought they should break away from that not merely on the score of cost and maintenance but also in regard to more accurate control of the combustion rate.

Dr. Eaton had referred to the fuel consumption of the coke fire. Over the heating period the total average amount of fuel used was about 40 cwt., which at £2 per ton represented a revenue per fire of £4. There were thus many advantages of the coke fire from the revenue point of view.

It was remarked by another speaker that from experience gained in developing the sale of the coke grate the two most important factors which made it popular were, first, gas ignition, and, secondly, chimney sweeping was unnecessary. The question of smoke abatement did not interest the average householder unless by using a smokeless fuel he could heat his house at less cost. It was certain that coke fires would never have developed to any extent without the gas-ignition burner. The modern tendency to develop the barless type of grate, which was only completely satisfactory for cokes of good combustibility might lead to difficulties, particularly if, for reasons outside the control of the Gas Engineer, it became impossible to produce cokes of the desired quality. Such difficulties had indeed already arisen in some districts where the type of coal normally carbonized had not been available and the quality of the coke has suffered in consequence. It was reassuring to note that most barless fires could now be supplied, if required, with a deepening bar so that a certain degree of flexibility in the quality of the coke supplied for open fires was allowable. It should be emphasized, however, that the rate of ignition of a poorly combustible coke could not be increased by increasing the depth of the fuel bed but only by using more gas. Many complaints of poor behaviour of coke fires were due to poor lighting, and they had found that in dealing with complaints the first matter to investigate was the efficiency of lighting.

Too much attention, it was suggested, was given to the question of chimney draught. The effect of chimney draught was very small compared with the effect of small variations in the properties of the coke or the method of stoking the fire. It was, however, important that coke fires should never be fitted into chimneys which suffered from down-draught. Dr. Eaton had emphasized the effect of the number of air changes upon the efficiency of the coke fire, and a large number of complaints of insufficient heating were caused by too much ventilation. That was one reason why some gas undertakings preferred to rebuild the fireplace with bricks which gave a chimney opening of a definite size. 40 sq.in. was considered to be adequate and it was not considered advisable to reduce the opening to the lower figure of 17 sq.in., mentioned by Dr. Eaton, on account of the danger of products coming into the room during the lighting period.

Another member referred to the statement that with the independent type of stove the radiation and convection from the casing gave an increased efficiency of 16 to 22%. He felt that the same efficiency could be obtained with a closed stove, but that the latter had the additional advantages—first, that it could be kept alight without difficulty overnight, and, secondly, the doors, acting as a blower, facilitated both ease and quickness of lighting and subsequently the control of combustion. For the working-class dwellings he thought that the most economical heating arrangements were the independent stove, with doors, fitted with a back-boiler. Gas would be used for cooking.

It was emphasized that it was all very well to discuss new designs, but there was a certain psychological importance in adhering to the orthodox. If they departed from this they might be making a grave mistake. Dr. Eaton had pointed out that improvement had been taking place steadily and uniformly, and they were trying to develop the grate in accordance with the type of fuel they had at their disposal. The views of the average householder in regard to smoke abatement had been rather belittled, but it was felt that the smoke abatement aspect was one of considerable importance given satisfaction in the consumer's pocket in the first instance.

Pleasure was expressed that something was being done in connection with the improvement of fire bricks, a question which had been hitherto rather overlooked. With regard to back-boilers, Dr. Eaton led them to believe that the production of hot water by this means was not an efficient method. Efficiency was not always of paramount importance with the consumer, and it was a fact that the back-boiler was the most universal method of hot water production in this country at the present time. The difficulty lay not in the back-boiler itself but in the storage tank, which was frequently of inadequate size. Lagging of the tank would be an advantage.

In regard to the method of lighting a coke fire, it was suggested that it was best to light the gas before placing the coke on the fire. It was asked whether the use of a blower would reduce the volume of gas required for lighting. The view was expressed in this connection that there would be no saving in gas but that there would be a saving in lighting time. While a blower might be an advantage, the damage which could be caused to the grate if it were left unattended with the blower in operation should be carefully considered. With regard to design of coke grates, it was considered preferable to have bars in front; but they had to meet the wishes of consumers, and many people would not consider a coke grate unless it was of the barless type.

Replying to the discussion, Dr. Eaton said that there seemed to be some difference of opinion on the procedure to adopt in lighting a coke fire. The method, given in the Paper, of charging with coke first and then lighting the gas, was best for fires which incorporated a luminous ignition burner. With atmospheric ignition burners, which were in general less accessible, he agreed that there was less chance of firing back if the gas was lighted prior to filling up with coke. The greater accessibility and freedom from firing back was responsible for the almost universal adoption of the luminous burner. It should be emphasized, however, that the efficiency of the luminous burner depended not only on the correct location of the burner but also on the regulation of the gas rate. A restrictor should be placed in the gas service to the fire and the length of gas flame adjusted to about 9 in. where the burner had gas ports at alternate fire bar spacings and to about 6 in. where there was a gas port to each fire bar spacing.

The use of a blower to speed up the rate of ignition had been mentioned. For working-class dwellings where the cost of fire lighting was of importance the use of a blower might be desirable, but in general the possibility of damage to the grate more than outweighed the advantage of increased speed of lighting. The doors of the closed stoves acted as a blower, but here the danger of too high a combustion rate was minimized by limiting the area of the air inlet. Closed stoves were not very popular possibly because they gave rise to stuffiness caused by too much back ground heating together with insufficient ventilation. When the doors were shut the ventilating effect of the chimney was reduced to a negligible value. The closed stove was a very suitable appliance for a lounge hall where the ventilation was already adequate, without the aid of a chimney, but he could not agree that it was a suitable appliance for working-class dwellings.

With regard to back-boilers, he felt that while they might be popular with the builders because they were cheap, most consumers would prefer a coke boiler. The two-purpose appliance was seldom satisfactory, and in the case of the back-boiler the balancing of the demand for hot water and for space heating was always a difficulty. Lagging of the storage cylinder would overcome the disadvantage of an inadequate supply of hot water in the morning, but would probably lead, with the present designs of back-boilers, to complaints of too much hot water during the day. He felt that the best solution was to fit a gas circulator which could be used as the sole means of obtaining hot water in the summer months.

Mr. Nicol had mentioned the high temperatures attained on the fire bricks of coke fires and questioned whether any other solid fuel burned at such a temperature. The figures given were maximum figures, and it was extremely doubtful if a brazier type of fire would burn coke and give a satisfactory fire at a lower temperature. After all, the high radiant efficiency of the coke fire and its pleasing appearance could be attributed to the high temperature of burning. He was very pleased to hear that Mr. Nicol was continuing his pioneering work and hoped he would shortly have an opportunity of examining the performance of the N.C. Brazier coke fire.

THE DEVELOPMENT OF

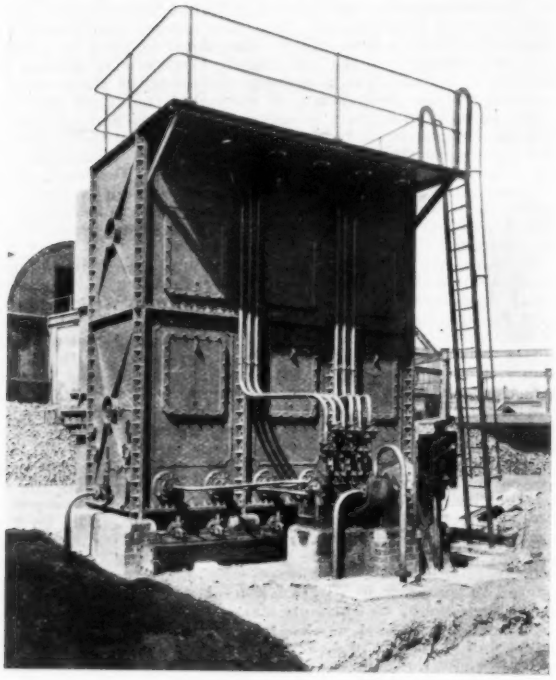
Wet Purification Plant

BY

F. B. HOLMES,

of W. C. Holmes & Co., Ltd.

From a Paper presented to members of the Scottish Junior Gas Association at a Joint Meeting held at Edinburgh on Feb. 27.



The Holmes "Multifilm" Washer, Used for Ammonia, Naphthalene, and Benzole Recovery, and for Dri-Gas Washing.

In 1883 the Holmes rotary brush washer was introduced, in its first form of a single chamber. The brushes were mounted on a disc placed centrally in the chamber, the gas being made to pass radially outward on the one side of the disc, and back to the centre on the other, the brushes completely filling the width of the chamber. This washer, incidentally, incorporated an external annulus not required for the washing operation, but intended to be used for cooling the gas during the washing operation.

In 1895, still chambers were introduced, being interposed between successive sections. These took the form of narrow empty spaces, and their purpose was to reduce diffusion and entrainment between sections—a precaution which had become recognized as being of the utmost value in sectional washers.

A vertical form of this machine was also built with a view to saving ground space, but was eventually abandoned owing to the much higher cost of manufacture over the standard horizontal machine. Machines of this type are still in operation at Greenock and in England and abroad.

In the 1920 design of Holmes brush washer the still chambers disappeared, but the gas velocity was diminished by dividing the gas flow in each section so that the gas passed in parallel on both sides of the brush supporting plate. This alteration resulted in the largest single unit capacity increasing the 7 million cu.ft. of gas per day, as against a maximum of 5 million cu.ft. of gas per day with the "still chamber type" of machine, when used for ammonia washing.

A further important advance in design was the division of the unit into two separate sections, each having its own by-pass, the drive being placed in the centre, so that either half of the machine could be shut down for inspection and repair while the other half could remain in operation.

Centrifugal Washer.

This form of washer may be said to mark a second stage in intensive design with comparatively short time contact as opposed to the slow gas movement and long time contact of the tower scrubber, the horizontal washer scrubber being the first stage. In the early 'nineties Feld, of Germany, designed a machine of this type which was built in this country by Messrs. R. & J. Dempster, Ltd., of Manchester. Other types were built by Messrs. Kirkham, Hulett, & Chandler, and Messrs. Clapham Bros., Messrs. Blair Campbell & McLean, and Messrs. Meldrum. The Davidson & Liversidge centrifugal washer was introduced in 1918.

Large capacity for gas treatment in proportion to space occupied; low capital cost in relation to capacity; low power consumption and low resistance to gas flow causing little back-pressure are some of the advantages claimed for the centrifugal type of washer.

The "Static" Type Washer.

The most recent form of stage washing apparatus is that known as the static washer. As in the case of the rotary type, this machine depends on its efficiency on intimate contact between the gas and the washing medium travelling in counter-current over wetted surfaces in a series of chambers.

Instead, however, of the filling being rotated to secure re-wetting, the filling is stationary and its surface is kept continually filmed with the washing medium by recirculation by means of a series of pumps which lift the oil or liquor from the base of the washer and distribute it over the upper part of the filling, through and down which it flows by gravity.

Original washers of this type were built in the United States of America by Doherty in 1907, and they are built in this country by Messrs. Wilton and Messrs. Newton Chambers.

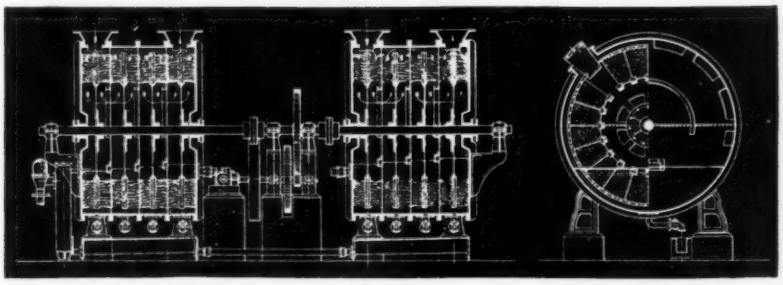
The Holmes "Multifilm," an improved form of static washer, was patented in 1930. The filling is the same material as is used in the Holmes rotary brush washer, being constructed from a special reed grown under water, which is practically indestructible, being unaffected by the gas or washing medium. The circulation system embodies several novel features, the most interesting being the type of spray which can be kept consistently clear without interruption of work, and which may be directed by a single movement on to the inspection windows. The circulating pumps are built together in one block, up to six units, on a common shaft with one gland. The principle of construction of the washer is such that it can deal with large liquid throughputs, which are characteristic of benzole and gas dehydration plants, or minimum rates of liquid flow, as in the case of naphthalene and ammonia removal.

Tar Extractor.

The Cyclone tar extractor, the use of which was first suggested by Dr. Colman, has been installed on many gasworks, and being placed on the inlet of the primary condenser serves as an expansion chamber between the collecting main of the retort house and these condensers, resulting in a considerable quantity of the heavy tar being recovered at this point.

The employment of a Livesey washer, prior to stage washing, is still almost universal practice, in many cases followed or preceded by a "P. & A." tar extractor. This apparatus was devised by the two French chemists, Pelouze and Audouin, from whom it takes its name. The machine consists of an outer cylindrical casing with the gas inlet at the base. A polygonal bell is suspended from an overhead pulley with its base sealed in liquor, and is counterbalanced.

In the Holmes type of construction the bell consists of a top plate with cast steel posts at each corner, the spaces



Section Showing Double Unit Rotary Brush Washer.

between the posts being fitted with bundles of perforated and slotted plates. The perforations are arranged so as to obtain the greatest possible baffling and breaking up of the gas on its passage through the drum. The machine is fitted with safety valves so that should the suspension chain break a gas passage is provided.

The action of the machine is automatic in that the amount of drum surface exposed to the gas varies in accordance with the quantity of gas with which it has to deal.

The Electrostatic Detarrer.

This was first introduced in this country by Sir Oliver Lodge, and in America by Cottrell, who together designed and patented the Lodge-Cottrell precipitator.

The plant consists essentially of two parts, first the precipitator, which takes the form of a cylindrical vessel in which are suspended the negative electrodes between the earthed discharge electrodes, which consist of concentric plates or tubes, and secondly the electrical equipment for supplying the high tension current using a step-up transformer. The high voltage alternating current is rectified by means of an insulated disc or cross, in synchronism with the frequency. The Whessoe-Woodall Duckham system uses a generator set, comprising two or three special high tension generators coupled in line, the prime mover in either form being an electric motor or steam engine. A further method is the static rectifier made as an alternative to the mechanical rectifier by Messrs. Lodge-Cottrell or Simon Carves.

The theory of electrical purification is as follows:

The negative electrodes are in the form of wires or thin strips and are arranged parallel between the earthed conducting plates; these discharge electrodes are connected to the negative pole of a generator of from 30,000 to 65,000 voltage d.c., in accordance with the distance between the plates and the nature of the gas under treatment. The corona effect so produced arises from a large number of luminous points clearly visible in the dark. If a gas charged with dust or vapour is passed between the plates at a suitable speed (0·5-2 in./sec.), whatever the nature of the particles in suspension may be, they will be removed and deposited on the earthed electrodes. Two actions are produced.

(1) An electrical wind coming from the luminous points.
(2) Electrostatic effect arising from the electrical field between the negative electrodes and the deposit electrodes.

By means of the electrical wind, the suspended particles in the gas are blown by the discharge electrodes into close proximity of the earthed electrodes. By reason of their electrical charge, a mutual attraction is produced, so that the gaseous particles which are already propelled in the direction of the plates by the electrical wind are further attracted.

The electrical wind plays an important part in electrical precipitation. When the electrodes are surrounded by a thick coat of dust this wind cannot arise, so that the precipitation effect falls almost to nothing, in spite of the electrical field. The electrostatic attraction only plays an important *rôle* in the second part of the process, just before the suspended particles reach the earthed plates, which have a different polarity.

These particles are attracted by the plates, their electric discharge takes place, so that they themselves assume an attractive pole for the particles following after, which coagulate in very large numbers at a speed reaching several metres per second, after the manner of an uninterrupted bombardment.

The efficiency of the apparatus is dependent on:

(1) Time of contact of the gas in the precipitation zone.
(2) Nature of the suspended matter and, to a less extent, on the nature of the gas.
(3) The quantity of current passed in relation to the gas volume being dealt with.

The plant is normally guaranteed for tar extraction to be 99% *plus* or *minus* 1%.

Naphthalene Removal and Benzole Recovery.

In about the year 1919 the system of washing with gas oil was introduced whereby the naphthalene content of the gas was reduced to below 1 grain per 100 cu.ft. of gas, using on the average 20 gallons of oil per million cu.ft. of gas treated. The oil after use was usually carburetted in the normal way in a C.W.G. plant. At about the same time the South Metropolitan Gas Company installed rotary washers for the same purpose, using anthracene oil as the absorbing medium.

It is interesting to note that it was the difficulty of disposing of the used oil on numerous works, where carburetting was not practised, that led to the introduction of the "continuous oil regeneration plant," whereby the oil could be used for long periods without renewal.

The extraction of benzole from town gas in Great Britain originated in the war-time demand for toluole and benzole for the manufacture of high explosives, but when this ceased, with few exceptions the process was considered an unremunerative one, and plants were allowed to be idle.

Later a simplified system of oil stripping was introduced embodying automatic control and the introduction of the tax on imported oil making the process again a profitable one. Increasing numbers have been installed, until to-day the output of benzole from English gas undertakings equals 12 to 15 million gallons of benzole per year.

Gas Dehydration.

The "Dri-Gas" process was brought into commercial use in 1926. The principle involved is the lowering artificially of the dewpoint of the gas. The gas is washed with a solution of calcium chloride, the moisture content at normal temperature being reduced up to 60%. The moisture absorbed into the bulk of the solution is thrown off into the atmosphere by continuously exposing a small proportion on the surface of a rack type evaporator, the exhaust steam from the engine and circulating pumps being sufficient for this purpose.

Another method of gas drying, using glycerine as the absorbent, was introduced by Messrs. Kirkham, Hulett, and Chandler.

In the majority of cases the gas is treated immediately before storage, entailing the necessity of sealing with oil the water in the tanks of gasholders of the water-sealed type, to prevent re-absorption of moisture by the gas.

Mr. H. Hollings, of the Gas Light and Coke Company, following his investigations as to the cause of gum formation, outlined in a Paper read before The Institution of Gas Engineers at the Autumn Meeting last year, submits arguments in favour of dehydration after storage. Modern types of washer can now be designed to carry out this duty, with comparatively low back pressure, even at times of peak load.

Discussion.

Mr. WEBSTER (Port Glasgow) asked whether, in a static washer, the liquid flow was constant or whether it could be varied. Also, in regard to the electrical detarrer, what was the smallest unit made, and the cost per million cu.ft.?

Mr. HOLMES replied that the amount of water fed into the machine controlled the amount at the outlet, as in the original type of machine; on Dri-Gas, continuous circulation whatever capacity the washer was dealing with. The cost of the electrical portion of a detarrer did not vary very much, with the result that for a small plant the cost of the unit was high in comparison with a unit of very much greater capacity. The actual cost of running the detarrer was more than paid for by the reduction in cost on the exhausters, by reduced back pressure

thrown through the elimination of a tar extractor, and cleaner purifiers.

Mr. REA (Perth) enquired what was the effect of high oxygen content in gas, and the cause of valves sticking on consumers' meters. Why were there so few centrifugal washers?

Mr. HOLMES replied that it was known that high oxygen content in the gas should be avoided, as it accelerated corrosion on mains under moist conditions, and although it was not a primary cause of gum formation, it took part in the gum forming reaction, so that a low concentration of oxygen gave some help in avoiding gum troubles. Oxygen to any great extent was added usually for the assistance of the purifiers, and in many works was drawn in at the suction side of the exhauster in controlled quantities. In a few cases it might be introduced by heavy pulling on the retorts, and in all cases the undertaking would benefit by the substitution of other diluents than air. Air drawn into retorts in this way was a very potent cause of nitric oxide formation, which was the accepted primary cause of gum. He had referred to a Paper recently read before the Institution, and the evidence available to them agreed with the broad statement that gum was caused by the reaction of nitric oxide with certain volatile gas constituents, but they did not consider it quite as positively proved that the history of the gum could be explained or controlled with quite the thoroughness which was expressed in that Paper. Most engineers preferred a slow running machine against a high speed machine, which naturally meant bigger wear and tear. The absence of electrical power also made centrifugal washers less popular, as an electrical motor was the most suitable drive.

Mr. REA asked what was the method of testing the quantity of tar in gas before and after the tar extractor, and what was the back pressure thrown by a static washer?

Mr. HOLMES replied that the testing could be carried out by means of the normal filter paper method. The back pressure thrown was small, and was normally under 1 in.

Mr. DAVIES (Alexandria) asked whether the Author would recommend a P. & A. to follow or precede the Livesey washer. Did Mr. Holmes recommend dismantling of tar extractors?

Mr. HOLMES: Before with verticals, after with horizontals. Dismantling of tar extractors might become necessary after a period of working, but many people had a spare drum which was put into the machine while the other was cleaned.

Mr. DAVIES: Do you recommend keeping the P. & A. in constant use?

Mr. HOLMES: Yes.

Mr. DICKSON (Newport, Fife) asked what was the effect on efficiency of washers placed before or after tar extractors.

Mr. HOLMES replied that the efficiency of the washer was dependent to some extent on being able to keep this in proper condition. If installed before the tar extractor there would be serious danger of its getting fouled with tar, with loss of efficiency. He knew of cases where rotary brush washers had been installed without efficient tar extractors in front of them, and it had necessitated their being cleaned fairly frequently to obtain good results.

Mr. SMITH (Dumbarton) asked whether it was economical to seal the water in the holder, and whether the Dri-Gas washer should be before or after the holder?

Mr. HOLMES said that the question of sealing the water in the tank of a holder, unless it was necessary on account of a Dri-Gas plant being installed before the holder, was a matter for an engineer's personal opinion. A Dri-Gas plant could be installed either before or after the holder. The latest theory was that after the holder was preferable. The position, however, was often dictated by the special conditions existing on the works as regards connections, &c.

Mr. STURROCK (Greenock) asked what was the dividing line as regards the size of works at which it was profitable to extract benzole.

Mr. HOLMES said that Greenock distributed gas at 410 B.Th.U., and he assumed that one of the reasons for this had been a general difficulty in the past of disposing of coke. Such a state of affairs was unfavourable to recovery of benzole, except insofar as the benzole which could be abstracted if the calorific value was slightly raised sold at a better therm price than the gas itself. It was not possible to lay down a rigid figure for the size of works which could extract benzole economically under these conditions. Under present conditions of coke and benzole markets, there was no doubt that a profit could be made even under these conditions on works of a capacity of 100 million cu.ft. per annum. What would determine the actual financial result would be the price that would be realized for the additional coke thus made as compared with the cost of the additional coal which would be carbonized. If the sale price of this additional coke was equal to or better than that of the coal, per ton, it was probable that the benzole extraction would pay. On works of a capacity of 50 million cu.ft. per annum and under, the capital and labour charges become relatively heavy, even under the most favourable conditions of net cost of coal.

Mr. DOW (Kirkcaldy) asked whether there was any danger in starting up detarrers, and whether tubes swaying might cause a short circuit.

Mr. HOLMES replied that it was necessary thoroughly to purge the detarrer of air previous to starting up. The surge of the exhauster might cause electrodes to swing, but this was overcome by means of a weight attached to the framework carrying the negative electrodes.

ALWAYS IN STOCK

STANTON

"New" Spun Iron Pipes

12 Feet Lengths	18 Feet Lengths
DIAMETER	DIAMETER
ins.	ins.
3	—
4	4
6	6
7	7
8	8
9	9
10	10
12	12

Vertically Cast Iron Pipes

9 Feet Lengths	12 Feet Lengths
DIAMETER	DIAMETER
ins.	ins.
3	—
4	4
6	6
8	8
9	9
10	10
12	12
	15
	18
	24

The Stanton Ironworks Company Limited, Near Nottingham

General Refractories, Ltd.

(Manufacturers of Heat-Resisting and Heat-Insulating Materials)

SHEFFIELD

Another Year of Record Progress and Profits

Products in Ever-Increasing Demand

Dividend Increased to 16 Per Cent.

Mr. Frank S. Russell's Speech

The Thirty-seventh Annual General Meeting of General Refractories, Ltd., was held on Wednesday, March 31, in Sheffield.

Mr. FRANK S. RUSSELL (the Chairman) presided.

The CHAIRMAN said that the year under review had been one of continued expansion, enlarged output, and increased employment, the latter being a cause of considerable satisfaction to the Board. The annual growth of the figures of the wages lists of the group was rather impressive, and he was very glad that the improvement in trade, which had followed the wise and brilliant policy of the National Government, had permitted the Company to increase the number of its employees, and thereby ensure comfort and happiness to many households in which care and penury had previously existed. During the year the internal organization had been strengthened and a portion of the selling arrangements had been decentralized into branch offices under efficient managers.

After offering thanks to his co-Directors, the staff, and the employees generally for their co-operation, and announcing the establishment of a pension fund—to which the Company had contributed £5,000—he said: When we met here last year I said I trusted we should meet again 12 months later to celebrate still another record year. This hope has been fulfilled, and as you will have noted from the report our sales in the year are more than half as much again as they were in the previous year, and our profit is far in advance of any figure it has ever reached before. Our own operations alone, without dividends on our holding of Ordinary shares in subsidiary companies, yielded us £66,741, as against the £55,392 realized in 1935, and which was the total of our own earnings added to the dividends mentioned.

The Genefax Group is now a very substantial combination for producing both refractories and profits. A close estimate of the gross profits earned by the other members of the group during last year (apart from our own) is in the neighbourhood of £79,000, subject to interest charges of about £9,000 and depreciation allocations totalling possibly £10,000. To the substantial bulk of the balance we are entitled by virtue of the proportion of the shares we hold, added to which there is, of course, an accumulation of substantial value standing to the credit of profit and loss accounts.

Final Dividend.

The Board recommends the payment of a final dividend of 10% (less income-tax), making, with the interim dividend of 6% (less tax) paid on Aug. 17 last, 16% for the year (as against 15% for last year).

In order to save expense and trouble it is intended to post the dividend warrants along with this report and the provisional allotments of the new share capital, if the issue of the latter be sanctioned at the meeting which follows.

Consolidated Accounts of the Subsidiary Companies.

Instructions have been given to our Auditors to prepare a consolidated balance-sheet as at March 31 from the accounts of the subsidiary companies which are being made up to that date, and this we hope to include with the progress report we intend to distribute early in August next along with the interim dividend.

This non-inclusion of the subsidiary dividends in current year's profits means that we can now always have a year of their dividends in hand. These provide a fund from which our own interim dividend can be paid and, in addition, the new system leaves plenty of time in which to prepare the accounts of the subsidiaries, hold their meetings, and declare their dividends—a strong and conservative position which I know you will approve. We look forward with considerable confidence to the combined profits of the other members of the group being well in excess of our own, and feel we are entitled to expect this in return for our extension, improvement, and reorganization of their means of production.

On the advice of eminent accountants we are placing the audits of our principal English subsidiaries in the hands of our own Auditors, and the Scottish audits in the hands of one firm of high standing there.

The Accounts.

Turning to the accounts there seems to be little for me to say because of the simple form in which they are presented. The capital was increased to £475,000 and has fully justified itself. The creditors are higher, but the debtors are proportionately higher still.

The total reserves are now within measurable distance of the total of the issued capital and may be equal to it next year. The credit balance carried forward to next year is only £8,000 less than it was last year, though this year's profits do not include the dividends I have mentioned, and we have put £3,000 more to income-tax reserve, £1,000 more to depreciation reserve, and have paid and are paying out in dividends nearly £20,000 more than last year. The value of our assets in the way of land, buildings, plant, &c., at cost, is £70,000 more than it was last year, and our holdings in other companies are worth £220,000 more than they were. Our stock-in-trade is higher by £25,000, and as against our creditor accounts of not more than £200,000 (including taxation) we have assets of over £1,000,000. The value of our stocks of raw materials has increased considerably since we acquired them.

National Value of Heavier Stocks of Imported Materials.

With regard to this matter of stocks, it is our intention (for which we have already made arrangements) still further to increase the size of these stocks in order that our group may, in the event of a serious European disturbance, be independent of foreign supplies for many months to come. This is a measure of wise precaution which constitutes "preparedness" in accord with national policy, and works hand in hand with the National Re-armament Programme. As the cost of these materials is high, there is a considerable sum involved in financing them, and it is partly for this purpose that our new issue of capital is being made.

The country learned a lesson about stocks in 1914, and here I would emphasize to all parties concerned the value in any time of National emergency of a group such as our own, under one control, with **its productive resources expanded, strengthened, and mechanized during times of peace and prosperity, ready for the worst that may happen,** whether it be the "rainy day" which many recent speakers appear to regard as inevitable, or an international conflict.

"How Long Will It Last?"

In mentioning the idea of a "rainy day" and being prepared for it, I am inevitably reminded of the "how-long-will-it-last" query, which seems to epitomize the attitude of some who sit in high places. I have long pondered over the reason for this, and have after protracted thought arrived at the conclusion that such speakers and writers were so much impressed by the not far distant slump from which we have now happily emerged, that they began to regard it as a normal state of affairs, and are at this moment timorously counting the hours that it seems to them must elapse before they are once again plunged into despair. I cannot find that this pessimism is in any way justified. Looking back at figures extending over many long years of the past, I do not find the slump conditions of 1930, 1931, and 1932 to be normal at all but, on the other hand, definitely abnormal, and I see no reason why (rearmament or no rearmament) we cannot with the added wisdom that our sufferings have taught us, continue indefinitely with that steady yet progressive "going on" which was accepted to be our due in Victorian years. What is known as "Prosperity" can easily be defined by such people as ourselves to mean "a demand for our goods." That demand arises from a demand for the goods of the consumer of our own products. That demand in its turn arises from other demands which can be shown to be born ultimately of a feeling of confidence in the future on the part of those with money to spend. This means that when those who hold the money bags are willing to adventure their wealth there is a larger demand for our products, our overheads cease to absorb the profits, and we become "prosperous." Because of the fact that they risk so much to gain so little, it is obvious that the inhabitants

of the world of finance must necessarily be cautious, not to say timid, in their whole outlook. A breath of wind will ruffle the financial sea and it is only when those who navigate it feel certain that there is a reasonable expectation of calm weather that they will launch their golden argosies upon its somewhat treacherous bosom. It is important that their apprehensions be not aroused needlessly.

"There is Nothing to Fear But Fear Itself."

The man who asks how long it will last is showing fear and thus tending to undermine confidence. "Good trade" is nothing more or less than the result of our being willing to spend our money because we feel reasonable confidence that conditions will be such as to permit us to earn some more money to take the place of what we spend—just the contrary to the thought that we must not indulge in cake for fear the money might be wanted for bread—in a phrase, "Prosperity is the daughter of Confidence."

The vast national expenditure on armaments cannot do other than create confidence. Armaments cannot be made without refractories (and neither can war), so for this industry at least it would seem that the future holds nothing in the way of cause for immediate despondency.

Million Sales.

For the ensuing twelve months, we have set our hearts and minds on achieving the sale of a million pounds' worth of goods, and I see no reason why we should not succeed—in fact, I feel very certain that we shall do so, as our sales organization is being strengthened and extended, our existing branch offices will have got better into their strides, new ones (Birmingham, Middlesbrough, and Cardiff) are being put into commission, many of the works are being extended and their output increased, the demand continues unabated and is increasing, and the strength we derive from our combination grows daily more apparent in the way in which the large contracts tend to gravitate to our group.

I am looking forward with confidence to being able, at the silver jubilee celebration banquet, which the Company intends to offer to its staff on April 1 next year, to make the announcement that this one more milestone has been passed. We increased our sales by nearly a quarter of a million pounds this year, and expect to achieve a still more important increase in 1937.

Records and Statistics—A Measure of Progress During Recent Years.

At Date of Report of	1934.	1935.	1936.
The number of shareholders was .	1,409	2,037	3,002
With an average shareholding of .	327	328	344
The group's annual output capacity of firebricks of all kinds, in millions	23	47	87
The number of works, mines, and quarries, &c., in the group . .	41	68	105
Group expenditure on railway carriage during the year	£73,246	£102,330	£142,769

The number of super refractory bricks, such as magnesite, diazite, saxpyre and spinella, produced during the year at our now entirely mechanized model works at Worksop (probably the best equipped of its kind in Europe) was 41% greater than in 1935, which latter was 33% above 1934, which was 27% above 1933, which was 35% over 1932.

During the year the productive capacity of these works, which has been severely strained to keep pace with the demand, has been doubled, and they are now being additionally equipped by a hydraulic press at least equal to the most powerful in Europe, and certainly the most modern.

Record outputs of high-grade refractory bricks of quality still further improved are expected to follow.

New Products.

In the sales of new products the year has been chiefly remarkable for the increase in the output of "Saxpyre" bricks, which have definitely proved their value and reliability for use in basic open hearth furnaces, and have been sold in increasingly large quantities both in Great Britain and on the Continent.

The knowledge gained in the evolution of this brick has led to a close study of the whole question of "spalling" (by which is meant the destruction of the brick as a result of its surface peeling and cracking and flying off following exposure to heat). Its causes have been investigated and its cure discovered, and as a result we have placed on the market the non-spalling

"Spinella Brick,"

a compound of the spinels of magnesia, chromite, and alumina. The brick has successfully met the competition of a Continental brick of the same type which has made a certain amount of headway in this country in recent years, and those who have tried it report its superiority in every respect. There is an immense future before this type of brick, and we look forward to selling it freely in this country and abroad.

The Dolomax Brick—A Brick Based on British Dolomite.

Some two years ago we produced a basic brick consisting almost entirely of dolomite, a highly refractory mineral which may be freely obtained in our own country but which has ordinarily the defect of being subject to hydration. We evolved processes for its partial or complete stabilization, but the demand for this class of brick being then uncertain, we did not put it on the market. Now, however, that so much interest is being shown in refractories which tend to render us independent of imported goods, we have done so, and with very encouraging results indeed.

We are pressing this introduction intensively, and though we are convinced that the field of application of any brick based on dolomite is limited, we shall explore that field to the fullest extent.

Export Trade.

From time to time during the year British commercial leaders (and particularly Lord Riverdale) have emphasized the importance of this country developing its sales overseas (despite the intense home demand), because of its dependence upon imported foodstuffs. To this point of view we have fully subscribed, and we have by such means as are within our power developed our sales abroad.

The sales of this department of our business were, during the year, greatly in excess of those of the previous year, and arrangements we have completed point to a considerable further expansion during the current year, the sales for the month of February for example being twice those of February, 1936.

Our group is now building up a large export trade, based entirely on high quality, but so efficient are our processes becoming that we have little difficulty in competing in point of price also.

Insulation Against Heat Losses—The Easiest Way of Saving Money.

You will recollect the formation of International Diatomite, Ltd., and its issue being subscribed 16 times over. You will remember also that it acquired the majority shares in Moler Products, Ltd., and that we were to transfer the manufacture of our own Diatomite Heat Insulating bricks to the Colchester Works of the last-named and take over from them the manufacture of refractory insulating bricks and the sales of both classes of bricks.

This has been duly effected, the whole of the selling arrangements have been rearranged, and the new sales campaign is in full swing.

The protection of furnace brickwork against the loss of heat is becoming every day more and more a matter of course, and the whole subject is becoming better understood.

Every shareholder can help in spreading the knowledge of the value of heat insulation, because of its universal application, an application which includes houses, shops, flats, refrigerators, firebacks, ovens, kilns, furnaces, and boilers, because Insulite and Economite bricks resist the passage of heat and keep it out just as well as they keep it in.

Progress of the Subsidiaries.

The matter of their re-equipment and enlargement is being partially dealt with in the paragraph that follows, but you will be interested to hear that our Belgian works is now in full production on the execution of important orders, with a plant which is second to none of its type.

In our last progress report, I mentioned that one of our subsidiary companies was being enlarged to act as a holding company, to hold the shares of our subsidiary and associated companies. This has now been put into effect and the British Refractories Corporation, Ltd., which has its own organization under our own control, is already proving of considerable service in the simplification of the affairs with which we have to deal, and particularly in various types of joint action for the benefit of the group as a whole.

It is our ultimate aim to have only one subsidiary company whose accounts affect our own, and the arrangement whereby the year's dividends of the subsidiaries are being kept in hand is very helpful in this direction.

Company's Policy.

In reviewing the position of our Company, which is that of the controlling unit of a combine consisting of a matter of 35 companies, I would say a few words to those who seem from time to time to express a little fear lest our group become too large. I find that such thoughts emanate mainly from individualists whose own businesses have never expanded, but reviewing the combines whose names are household words to-day, both for their importance and for the success of their operations, and whose size pales our own to insignificance, I note Allied Ironfounders with a capital of over two and a half millions, Associated Portland Cement Manufacturers with six millions, Calico Printers Association with over five millions, I.C.I. with 72 millions, Lever Brothers with 61 millions, Radiation Ltd. with over three millions, and Wall Paper Manufacturers with over five millions. I feel we can safely follow where these and such as these have led.

Our own policy in this matter has been so successful (though only in its infancy) that it needs no defence, but in that fine organ of public opinion, the *Financial Times*, I find a para-

graph referring to rubber companies, headed "That blessed word amalgamation," from which I quote some extracts:

> "What the boom did clearly demonstrate, was the needless labour and expense involved in there being such a multiplicity of companies, when, by a process of amalgamation, the industry could be so materially benefited and shareholders financially advantaged. The policy of amalgamation, to the 'common-or-garden' mind, seems no more than sensible and obvious. Why there should be scores of different companies, each of them paying London and other office expenses, and giving rise to innumerable difficulties . . . it is hard to understand."

This is precisely what we have done with a proportion of the British refractories industry, and we are now settling down to a policy of peaceful development of its interests, of exploitation of its mineral and other resources, and a general concentration, simplification, and consolidation of its activities.

"General Refractories" and "Refractories Generally."

Almost from the first inception of the Company it has been the aim and policy of those who control it to arrange that its name should be a true description of its functions and position. that is to say, that General Refractories shall deal in refractories generally, and not merely one section of that industry. This is a policy that has been steadily pursued for the last 24 years, by the addition of first one branch and then another branch of manufacture to the company's activities.

No one class of firebrick or type of refractory material works can meet the need of every section of users or every user, or be able to supply a consumer with all he requires.

Even during our earlier years our expansion was mainly in the direction of the acquirement of interests in existing plants, and we have always been averse to the idea of entering a field in direct competition to those already existing in it.

We are now heavily interested in the exceedingly important firebrick industries of Scotland and Stourbridge. We have acquired almost inexhaustible reserves of high grade fireclay in both areas. It would have been easy for us to have erected extensive modern works near them, but we preferred rather to take the line of least resistance and enter the field by the purchase of existing interests, as, for instance, Glenboig, Turnbulls, Castlecary, and Stevens.

World-Renowned "Glenboig" Firebricks.

Another advantage of this policy is that we thus acquire an existing connection and perhaps (as in the case of Glenboig) a brand held in high respect throughout the entire world.

Our expansion cannot be complete until our organization is rounded off, and by our control of a supply of refractories of every known type and for every industrial purpose, and there are still left a few departments with which we are not closely enough in touch (notably glass, cement, and refractory hollow-ware) and with which we must make alliances and provision therefore in our capital structure.

The Central Laboratory.

Research is so essential a feature of our industry, which must ever be in advance of the needs of its customers that there is no need for me to emphasize the advisability of our being second to none in Europe in our scientific equipment. Nothing will give our customers more confidence than this decision.

Silica Bricks—Famous "Lowood" and "Meltham" Brand.

The shortage of scrap iron makes the use of more pig iron imperative. To produce pig iron it is necessary to consume coke, and coke means coke ovens. The output of the famous Meltham Silica Bricks must therefore be expanded to help the country's rearmament programme (if for no other reason), and at the Lowood Works where the insistent demand (based entirely on the quality of the brick produced from the unique Deepcar Black Ganister) calls for an output at least twice that of the past, the output is being doubled by ultra-modern plant.

We have undertaken to supply "Refractories generally." We have secured an alliance with the makers of many of the best-known and most highly trusted brands, and we cannot sit with folded hands and say to our customers "Our output is limited to so much, and you must go elsewhere for the rest." This would be not only unpatriotic but in direct contrast to our policy, which has not been unsuccessful through the years, and we cannot consider its adoption, nor do we think that our shareholders would wish us to do so.

The New Issue of Shares.

All this, however, costs money, but so long as the money can be fully and adequately employed and earn a remunerative rate of return, this again is what the country needs to provide employment and prosperity.

This has a direct bearing on the meeting which follows, and whose purpose it is to authorize the increase in the Company's capital. We have thought it wise, while conditions are favourable, so to equip ourselves financially, that we may be in a strong position of independence, that we may be able to meet the conditions which may arise in less prosperous times, and, moreover, so to fortify our position (and that of your capital) that we may be able to resist all attacks upon it by way of either new refractories or new combinations of interest.

The Outlook.

With regard to the future, I have learned not to pretend to be a prophet, and I am not prophesying now, but I do think that the extent to which new methods, reorganization, modern machinery, and labour and fuel saving plant can increase earning capability is hardly thoroughly realized even by ourselves, nor the advantages we gain through our interests covering every field of our industry.

Our sales for the month of March are nearly twice those of last March. For much of our output of the cheaper grades of refractories we are obtaining a sorely needed advance in price. We shall have an increasing output to sell, and, on the whole, I shall be surprised if 1937 does not yield results very gratifying to all concerned.

I think that, between us, we have built up something with a high-survival value, something based on a sound economic plan, and something worthy to endure through the years that are to come.

The report and accounts were adopted, and at the extraordinary general meeting which followed, the resolution to increase the capital by the creation and issue of a further 300,000 Ten Shilling Ordinary shares was carried unanimously.

Gas Undertakings' Results

Corbridge.

The accounts of the Corbridge Gas Company show a gross profit of £1,085. A dividend of 6% has been approved.

Hong Kong and China.

The Directors of the Hong Kong and China Gas Company report that for the year ended Dec. 31, 1936, the quantity of gas sold was 164·5 million cu.ft. at Hong Kong and 76·5 million cu.ft. at Kowloon. Out of the balance of net revenue the Directors recommend the payment of a dividend at the rate of 6% per annum, subject to income-tax, less 3% paid as an interim dividend Oct. 30 last.

Leamington.

The report of the Directors of the Leamington Priors Gas Company for the half-year ended Dec. 31, 1936, states the gas sold shows an increase of 2·4% for the half-year, and an increase of over 4% for the whole year. An order has been placed for an extension of the retort house to meet the increasing demand and to enable necessary re-building of the present settings to be carried out with greater efficiency. Requests have been received for a supply of gas beyond the limits of the present area of supply, and an application to the Board of Trade is being prepared for an extension of the area of supply. At present there are a number of parishes which are included in the statutory areas of supply of both the Company and the Warwick Gas Company, and it is proposed to take the opportunity to allocate by agreement certain of these parishes to the Warwick Gas Company and certain of them to the Leamington Company. The Directors have recommended that the statutory dividends, less income-tax, be paid.

Wellington (New Zealand).

The annual report of the Directors of the Wellington Gas Company for the year ended Dec. 31, 1936, states that during the past year two miles of new mains have been laid and 1,322 services fixed. On Oct. 1, 1936, the mortgage debenture stock, £200,000, was redeemed. The various reserves have been consolidated to one general reserve which now stands at £105,000. After payment of the interim dividend of 4% on the ordinary shares, the year's dividend on the preference shares, and providing for depreciation of plant, buildings, and machinery, the balance to the credit of profit and loss appropriation account amounts to £28,879. It is recommended that this sum should be appropriated in paying a further dividend of 4% (making 8% for the year) and carrying forward the balance of £17,727.

Wisbech.

The Directors of the Wisbech Gas Company report for the half-year ended Dec. 31, 1936, that, in spite of the mildness of the winter, so far the consumption of gas had been fully maintained. The net profit for the past half-year was £4,073 and the credit balance of the profit and loss account amounted to £14,871; out of which the Directors recommended payment of the following dividends: Ordinary stock (£3 certificates) at the rate of 12% per annum; ordinary £5 shares at the rate of 11% per annum.

ENLARGING THE SUBJECT

getting the right perspective

and taking the long view . . .

. . . it really does pay to use

Simmance Patent

DEAD-BEAT RECORDERS

Accuracy
with
continuous performance

ALEXANDER
WRIGHT & CO., LTD.
WESTMINSTER. S.W.1

Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

The fact that it was a short week and the end of the long Account was responsible for the reduction in the volume of business on the Stock Exchange last week. On the whole, however, the tone was satisfactory and there were a few bright features. The gilt-edged market was steady throughout, and several stocks closed fractionally higher. Home rails failed to attract much support and prices sagged. Industrials were patchy, though Dunlops, on the increased distribution, Cable preference, and Indian Iron were good features. Tea shares were particularly strong, and prices closed anything from 2s. 6d. to 5s. higher. The rubber market was somewhat hesitant, a slight fall in the price of the commodity tending to restrict business. Kaffirs and oil shares experienced a general fall.

The Gas Market fared no better than other sections and the volume of business was very small, the current low prices doubtless confining transactions to forced sales. There were very few price changes, though it is important to note that among these was that of Gas Light units with an increase of 1s. to 25s., and the Company's 4% preference also hardened, closing 2 points up to 101½. At the Provincial Exchanges, Newcastle units and Liverpool ordinary were both marked up a trifle.

As the recent reactionary tendency in this market appears to have come to an end and prices are slowly moving in an upward direction, it may be of interest to intending investors to know the yields now obtainable on gas stocks and shares. The following table of some of the leading ordinary stocks, which are usually readily available, shows the dividends paid last year, the middle market price at this time a year ago (when the values of gas stocks were nearly at their highest point during the year), compared with the present price and the current yield, from which it will be seen that in the majority of cases a return of about 4½% is given:

Ordinary Stocks.

—	Dividend. 1935.	Price 1936. April 3.	Price 1937. April 2.	Yield on Current Price. %
	%			£ s. d.
Alliance and Dublin	8	155	164¼	4 17 3
Bournemouth 7%	7	171½	165½	4 4 7
Bristol	5	120	115	4 6 10
British	7½	160½	152½	4 18 4
Commercial	5	101	90½	5 10 5
Croydon sliding-scale	7	160½	147½	4 14 10
Gas Light units	£5 12s.	28s.	25s.	4 9 7
Liverpool	6	135	124	4 16 9
Newcastle	£5 7s. 6d.	26s.	24s. 3d.	4 8 8
Portsmouth	8½	172½	172½	4 15 7
Sheffield	6½	146½	145	4 6 2
South Metropolitan	5½	114½	109½	5 0 5
South Suburban	6	132½	124½	4 16 5
Tottenham	6¾	151½	139½	4 16 9
Wandsworth	7	160½	144½	4 16 10

The Alliance and Dublin Company increased its distribution in 1936 from £7 6s. 3d. to 8%, and Sheffield from 6% to 6¼%, while the South Metropolitan dropped from 5¾% to 5½% in 1936.

Current Sales of Gas Products

The London Market for Tar Products.

April 5.

The prices of Tar Products generally remain at the following levels:

Pitch, 36s. to 37s. per ton f.o.b.
Creosote, 5¾d. to 6d.
Refined tar, 3¾d.
Pure toluole, 2s. 4d. to 2s. 5d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, about 1s. 8d.; and 90/160 pyridine, about 8s. 6d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

April 5.

The average prices of gas-works products during the week were: Gas-works tar, 21s. 6d. to 26s. 6d. Pitch—East Coast, 35s. to 36s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 35s. to 36s.* Toluole, naked, North, 2s. to 2s. 1d. Coal tar crude naphtha, in bulk, North, 8¼d. to 8½d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4⅝d. to 4¾d. Heavy oils, in bulk, North, 5d. to 5½d. Carbolic acid 60's, 3s. to 3s. 1d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *April 3.*

Prices continue firm in most departments and enquiries are numerous. The feature of the week has been an increased demand for creosote oil, principally from the railway companies.

Crude gas-works tar.—The actual value is 36s. to 37s. per ton *ex* works in bulk.

Pitch.—The shipping season is now practically concluded and values are nominal at 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar is experiencing keen competition from bitumen, but prices are meantime maintained at 3d. to 3½d. per gallon free on rails for export, and 3¾d. to 4d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—Enquiries are more numerous and prices are firm accordingly. The following may be taken as about average values obtained during the week: Specification oil, 5½d. to 5¾d. per gallon; low gravity, 5¾d. to 6d. per gallon; neutral oil, 5¼d. to 5½d. per gallon; all *ex* works in bulk.

Cresylic acid.—Supplies continue scarce and the following prices can only be quoted as approximate: Pale, 97/99%, 4s. 1d. to 4s. 3d. per gallon; dark, 97/99%, 3s. 10d. to 4s. per gallon; and pale, 99/100%, 4s. 6d. to 4s. 9d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is only available in small quantities, value being round 6d. to 6½d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is 1s. 4d. to 1s. 5d. per gallon, and 90/190 heavy naphtha is 11d. to 1s. per gallon.

Motor benzole is quoted at 1s. 4d. to 1s. 4½d. per gallon.

Pyridine.—Prices are nominal at 7s. to 8s. per gallon for 90/160 grade, and 8s. to 9s. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole	0 9½	to	0 10	per gallon at works
Motor "	1 3	"	1 3½	" " "
90% "	1 4	"	1 4½	" " "
Pure "	1 8	"	1 8½	" " "

Contracts Advertised To-Day

Boosting Plant.
Brighouse Gas Department. [p. 59.]

Coal.
Burnley Gas Department. [p. 60.]
Sidmouth Gas Department. [p. 59.]
Tipton Gas Department. [p. 60.]

Compressors.
Loughborough Gas Department. [p. 60.]

Conveyor (Portable).
Blackpool Gas Department. [p. 59.]

Gasholder Resheeting.
Thornton Cleveleys Urban District Council. [p. 59.]

Gas Oil.
Sidmouth Gas Department. [p. 59.]

High-Pressure District Governors.
Loughborough Gas Department. [p. 60.]

Mainlaying.
Loughborough Gas Department. [p. 60.]

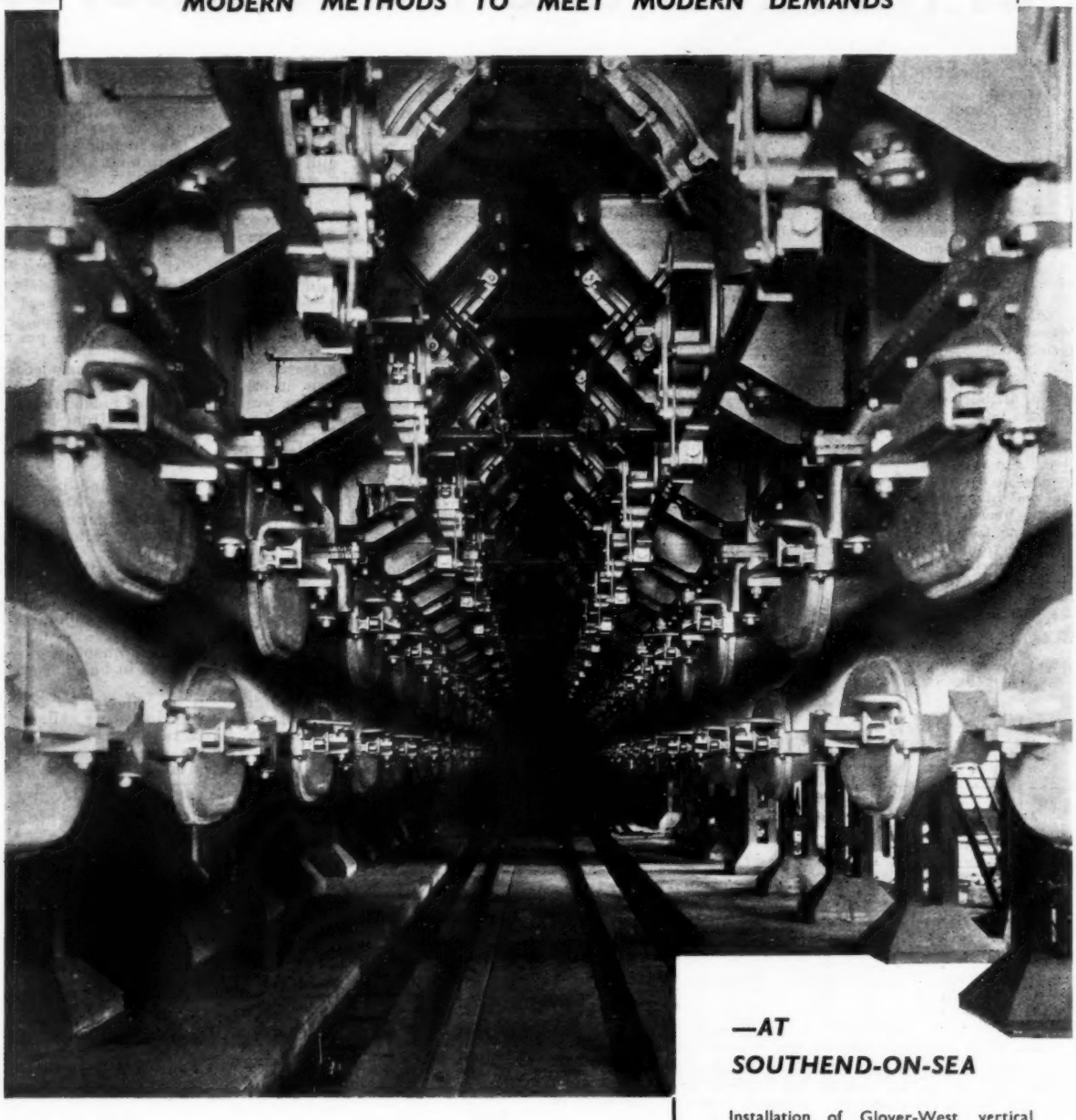
Meters.
Blackpool Gas Department. [p. 59.]

Painting.
Bexhill Gas Department. [p. 60.]

Retorts, &c.
Bexhill Gas Department. [p. 60.]
Brighouse Gas Department. [p. 59.]

Steel Main.
Loughborough Gas Department. [p. 60.]

MODERN METHODS TO MEET MODERN DEMANDS



—AT
SOUTHEND-ON-SEA

Installation of Glover-West vertical retorts which has now begun regular service at the Southend-on-Sea Station of the Gas Light and Coke Company (London). A view below the retort bench showing coke extractors, coke discharging mouthpieces and West lip bucket conveyors.

405 West-built carbonizing plants erected totalling **10,556** retorts and chambers with a nominal daily make of **579** million c.ft.

THE WEST SYSTEMS

GLOVER-WEST VERTICAL RETORTS ● WESTVERTICAL CARBONIZING CHAMBERS

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER: Albion Ironworks, Miles Platting — 'Phone: COLLYHURST 2961 — 'Grams: "STOKER, MANCHESTER"

LONDON: Columbia House, Aldwych, W.C.2 — 'Phone: HOLBORN 4108 — 'Grams: "WESGASCO, ESTRAND, LONDON"

STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Apl. 2.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Mar. 15	8	8	Alliance & Dublin Ord. ...	162—167*	...	...
374,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	96—101	...	...
558,890	,,	Feb. 15	7	7	Barnet Ord. 7 p.c.	160—165	...	160
300,000	1	Oct. 5	1/9⅔	1/4⅓	Bombay, Ltd.	26/—28/-	...	...
179,915	Stk.	Mar. 1	9½	9½	Bournemouth sliding scale ...	195—205	...	...
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	163—168	...	163—164½
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	133—138	...	...
50,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	80—85	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
357,900	,,	Feb. 15	7½	7½	Brighton, &c., 6 p.c. Con. ...	155—160	...	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	140—145	...	142½
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	130—135	...	...
855,000	,,	Mar. 1	7	8	British Ord.	150—155	...	151—152
100,000	,,	Dec. 14	7	7	Do. 7 p.c. Pref.	143—148	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	103—108	...	...
450,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1¼—3¼	...	...
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	80—85	...	...
626,860	,,	Feb. 1	6	6	Cardiff Con. Ord.	120—125	...	...
237,860	,,	Dec. 14	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
98,936	1	Oct. 19	2/-	2/-	Colombo Ord.	1⅞—2⅛	...	...
24,510	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	23/6—25/6	...	...
739,453	1	Mar. 15	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	17/—19/-*	...	...
296,144	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/-	...	...
1,775,005	Stk.	Feb. 1	5	5	Commercial Ord.	88—93	...	91
620,000	,,	Nov. 30	3	3	Do. 3 p.c. Deb. ...	73—78	...	75½
286,344	,,	Feb. 15	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
807,560	,,	Feb. 15	7	7	Croydon sliding scale ...	145—150	−2	146
644,590	,,	,,	5	5	Do. max. div.	109—114	...	110—112½
620,385	,,	Dec. 14	5	5	Do. 5 p.c. Deb.... ...	115—120	...	...
239,000	,,	Feb. 1	5	5	East Hull Ord. 5 p.c.... ...	100—105	...	...
185,355	,,	Feb. 15	6	6	East Surrey Ord. 5 p.c. ...	122—127	...	...
176,211	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
250,000	1	Nov. 16	6	4	Gas Consolidation Ord. ...	20/—22/-	...	...
250,000	1	,,	4	4	Do. 4 p.c. Red Cum. Pref.	19/—21/-	...	...
19,255,284	Stk.	Feb. 1	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	24/6—25/6a	+1/-	24/1⅛—25/3
2,600,000	,,	,,	3⅓	3⅓	Do. 3⅓ p.c. max.	75—80	...	78
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	99—102	+2	101—101½
8,602,497	,,	Nov. 30	3	3	Do. 3 p.c. Con. Deb. ...	78—81	...	78—79
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	110—113	...	111—113
3,500,000	,,	,,	4⅓	4⅓	Do. 4⅓ p.c. Red. Deb....	108—111	...	...
700,000	,,	Mar. 1	25/5⅝	3¼	Do. 3¼ p.c. Red. Deb....	96—101	...	...
270,466	,,	Feb. 15	6	6	Harrogate New Cons. ...	122—127	...	...
213,200	,,	Feb. 15	6	6	Hornsey Con. 3½ p.c. ...	125—130	...	...
5,600,000	,,	Nov. 2	12	8	Imperial Continental Cap. ...	157—162	...	158½—161
223,130	,,	Feb. 1	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...	—
285,242	,,	Mar. 1	8½	8½	Lea Bridge 5 p.c. Ord. ...	165—170	...	...
11,751	,,	Mar. 1	8	10	Maidstone Gas 5 p.c. Cap. Stk.	180—190	...	...
63,480	,,	Dec. 14	3	3	Do. 3 p.c.Prp.Db.Sk.	72—77	...	...
75,000	,,	Nov. 30	†10	†10	Malta & Mediterranean ...	150—160	...	...
392,000	—	Apl. 1	5⅓	5⅓	Metropolitan (of Melbourne) 5⅓ p.c. Red. Deb.	98—103*	−2	...
231,978	Stk.	Feb. 15	5	5	M.S. Utility 'C' Cons. ...	102—107	...	...
968,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...	97—97½
360,075	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	115—120	...	...
125,000	—	Jan. 4	3½	3½	Do. 3½ p.c. Rd.Rg.Bds.	97—100	...	...
675,000	Stk.	Nov. 16	†6	†6	Montevideo, Ltd.	83—88	+3	84½—85½
250,000	,,	Feb. 15	7½	7½	North Middlesex 6 p.c. Con.	160—165	...	...
396,160	,,	Feb. 1	5	5	Northampton 5 p.c. max. ...	102—107	...	...
300,000	,,	Nov. 2	†7	†9	Oriental, Ltd....	165—170	...	...
416,617	,,	Dec. 14	8	8	Plymouth & Stonehouse 5 p.c.	170—175	...	170
621,667	,,	Feb. 15	8¼	8¼	Portsmouth & Gosport Cons.	170—175	...	171
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	105—110	...	...
73,350	,,	,,	...	5	Do. 5 p.c. Pref. ...	112—117	...	...
363,470	1	Sept. 21	1/-	1/-	Severn Val. Gas Cor. Ld. Ord.	20/—22/-	...	21/-
454,510	1	Mar. 15	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	20/—22/-*	...	...
133,201	Stk.	Feb. 15	5	8½	Shrewsbury 5 p.c. Ord. ...	133—138	...	...
90,000	10	June 8	†3⅓	14	South African...	4—5	...	...
1,152,635	1	Sept. 7	1/2⅔	1/2⅔	South East'n Gas. Cn.Ld. Ord.	24-/—26/-	...	25/3
845,511	1	Mar. 1	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-	...	...
200,000	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	19/6—21/6	...	...
450,000	,,	Feb. 15	4	4	Do. 4 p.c. Deb.	100—102	...	...
150,000	Stk.	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	99—101	...	...
6,709,895	,,	Feb. 1	5	6	South Met. Ord.	107—112	...	107½—109
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	131—136	...	...
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	96—101	...	...
1,895,445	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	74—79	+1	76½—78½
1,000,000	,,	Jan. 4	5	5	Do. 5 p.c. Red. Deb....	107—112	...	113
1,543,795	,,	Feb. 1	6	6	South Suburban Ord. 5 p.c....	122—127	...	123
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	112—117	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	95—100	...	...
888,587	,,	Dec. 14	5	5	Do. 5 p.c. Deb....	115—120	...	117½
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	98—103	...	99
427,859	1	Nov. 16	1/2⅔	9⅔	S. Western Gas & Water Ord.	20/—22/-	...	...
160,523	1	Oct. 19	-/10⅔	-/10⅔	Do. 4½ p.c. Red. Cum. Pf.	20/6—22/6	...	...
110,000	Stk.	Dec. 14	4	4	Do. 4 p.c. Red. Deb. ...	98—103	...	...
750,541	,,	Feb. 1	5	5⅓	Southampton Ord. 5 p.c. ...	111—116	...	...
148,836	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	98—103	...	...
350,000	,,	Feb. 15	5⅓	5⅓	Swansea 5⅓ p.c. Red. Pref. ...	110—115	...	...
106,000	,,	Jan. 4	6¼	6¼	Do. 6¼ p.c. Red. Deb. ...	98—101	...	...
94,000	,,	,,	3⅓	3⅓	Do. 3⅓ p.c. Red. Deb. ...	95—100	...	...
1,076,490	,,	Feb. 15	6⅔	6⅔	Tottenham and District Ord.	137—142	...	...
409,835	,,	,,	5⅔	5⅔	Do. 5⅓ p.c. Pref....	123—128	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	115
371,850	,,	Nov. 30	4	4	Do. 4 p.c. Deb. ...	98—103	...	...
373,939	,,	Feb. 15	7	7	Uxbridge, &c., 5 p.c. ...	142—147	...	...
133,010	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
1,371,138	,,	Feb. 1	7	7	Wandsworth Consolidated ...	142—147	...	...
1,620,615	,,	,,	5	5	Do. 5 p.c. Pref ...	113—118	...	114
500,000	,,	,,	33/4	4	Do. 4 p.c. Pref. ...	95—100	...	97⅔—100
1,343,964	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	117—122	...	118⅔—120
383,745	,,	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...	...
558,342	,,	Feb. 1	7	7	Watford and St. Albans Ord.	142—147	...	...
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
200,000	,,	,,	5⅓	5⅓	Do. 5⅓ p.c. Pref. ...	123—128	...	...
200,000	,,	Dec 14	4	4	Do. 4 p.c. Red. Deb.	97—102	...	...
100,000	,,	,,	3⅓	3⅓	Do. 3⅓ p.c. Red.Deb.	95—100	...	...

a.—The quotation is per £1 of Stock. * Ex div. † Paid free of income-tax. ‡ For year. § Actual.

Stock and Share List continued overleaf.

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STOCK AND SHARE LIST—Cont.

Stocks Officially Quoted on Provincial Exchanges

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Yr. % p.a.	Dividends. Last Yr. % p.a.	NAME.	Quotations. Apl. 2.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.'	Feb. 1	5	6	Bath Cons.	121—123	...	...
1,667,250	,,	Feb. 15	5	5	Bristol, 5 p.c. max.	114—116	−1½	...
120,420	,,	Dec. 14	4	4	Do. 1st 4 p.c. Deb. ...	101—103	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101—103	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	122—125	...	...
274,000	,,	Mar. 1	5	5	Newport (Mon.) 5 p.c.max. ...	108—112	...	...
13,200	12	Mar. 15	7	8	Pontyp'l Gas & W. 10 p.c. 'A'	13½—14½	...	...
13,600	10	,,	5	6	Do. 7 p.c. 'B'	12—12½	...	...
40,000	10	,,	5	6	Do. 7 p.c. 'C'	12—12½	...	...
140,778	Stk.	Feb. 1	5	5	Weston-super-Mare Cons. ...	112—113	...	...
64,338	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	98—101	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	160—163	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Feb. 1	5	6½	Chester 5 p.c. Ord.	106—111	...	...
92,500	,,	Dec. 14	4½	4	Do. 4 p.c. Pref.	98—102	...	...
36,430	,,	,,	3	3½	Do. 3½ p.c. Deb.... ...	90—95	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	99—103	...	...
2,167,410	,,	Feb. 15	6	6	Liverpool 5 p.c. Ord. ...	123—125	+½	...
245,500	,,	Dec. 14	5	5	Do. 5 p.c. Red. Pref. ...	101—106	...	...
306,083	,,	Jan. 4	4	4	Do. 4 p.c. Deb. ...	103—105	...	...
106,280	,,	Feb. 1	10	10	Preston 'A' 10 p.c.	210—220	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	150—160	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Feb. 1	8	8	Blyth 5 p.c. Ord.	166—168	...	...
732,000	,,	Feb. 15	5	5	Hartlepool G. & W. Cn. & New	125—127	...	...
2,061,315	,,	Feb. 1	5	5½	Newcastle & Gateshead Con.	24/—24/6a	+-/3	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	95—96	...	...
776,706	,,	Jan. 4	3½	3½	Do. 3½ p.c. Deb. ...	95—100	...	...
277,285	,,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	108—109	...	...
332,351	,,	Feb. 1	6	6	Sunderland 6 p.c. max. ...	139—141	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Mar. 1	7	9	Derby Con.	160—180	...	...
55,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	100—105	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	...	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	...	...	...
20,000	10	Dec. 14	5	5	Do. 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Aug. 10	10	10	Great Grimsby 'A' Ord. ...	210—220	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	210—220	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—210	...	...
1,806,339	,,	Feb. 15	6	6½	Sheffield Cons.	144—146	...	...
95,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	101—104	...	...

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	Mar. 15	25/-b	25/-b	Ascot Ord.	102—107*	...	...
128,182	,,	Jan. 4	5	5	Do. 5 p.c. Pref.	110—115	...	...
312,083	1	Nov. 16	5	5	Assd. Gas and Water Ord. ...	19/6—21/6	...	...
326,071	1	,,	4½	4½	Do. 4½ p.c. Cum. Pref. ...	19/6—21/6	...	...
150,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100*	...	...
17,000	,,	Feb. 15	8	8	Bognor Orig. Ord. 'A' ...	160—170	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	160—170	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	140—145	...	...
37,440	,,	Feb. 1	10	10	Cam. Univ. & Town 10 p.c.max.	200—210	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	142—147	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	102—107	...	...
65,000	,,	Mar. 1	7½	8½	Eastbourne 'A' 5 p.c. ...	160—165	...	...
198,000	,,	,,	6	7	Do. 'B' 3½ p.c.	130—140	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
130,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	115—120	...	...
24,000	30	Feb. 1	8½	8½	Great Yarmouth 8½ p.c. max.	45—50	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.	40—45	...	...
51,160	Stk.	Dec. 14	5½	5½	Do. 5½ p.c. Deb.	122—127	...	...
152,600	,,	Feb. 15	8	9	Guildford Cons.	190—200	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	112—117	...	...
68,250	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	115—120	...	...
156,600	,,	Feb. 15	7½	7½	Hampton Court Cons. ...	150—160	...	...
107,960	10	Mar. 15	4	5½	Mid Kent Ord.	9—10	...	...
230,940	Stk.	Feb. 15	10	10	Oxford & District Ord. ...	200—210	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	112—117	...	...
126,193	,,	Nov. 16	7½	7½	Peterborough Ord.	162—172	...	...
64,990	,,	Mar. 15	6½	7½	Redditch Ord.	127—137*	...	...
166,850	,,	Feb. 15	8	8	Romford Ord.	157—167	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Mar. 15	5	5	Do. 5 p.c. Deb.	115—120*	...	...
10,950	,,	Mar. 1	8	8	Ryde Ord.	160—165	...	...
136,191	,,	Feb. 15	5	7	Scarborough Ord.	123—133	...	...
27,825	,,	Feb. 1	8	8	Shanklin & Ventnor Cons. ...	165—175	...	...
270,086	,,	Mar. 15	7	7	Slough Ord.	137—142*	...	...
21,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.... ...	113—118	...	...
28,872	1	Nov. 2	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—22/-	...	...
28,866	1	Mar. 15	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6*	...	...
137,730	Stk.	Feb. 15	7	7	Southgate & Dist. 7 p.c. max.	135—145	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
117,228	,,	Feb. 15	6	5	Swindon Cons.	108—113	...	...
60,425	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
64,380	,,	Dec. 14	5	5	Torquay and Paignton 5 p.c. Pf.	115—120	...	...
750,000	1	Oct. 5	5·52d.a	4	Utd. Kingdom Gas Cpn. Ord.	20/—22/-	...	21/9
936,338	1	Nov. 16	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-	...	21/6
674,084	1	Oct. 5	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pref.... ...	19/—21/-	...	19/—19/6
600,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—101*	...	...
130,000	,,	Feb. 15	5	8	Wakefield Ord.	132—137	−5	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	103—108	...	...
82,000	,,	Feb. 1	6	6	Weymouth Ord.	103—108	...	...
98,384	,,	Feb. 1	6	6	Wolverhampton 6 p.c. Pref....	125—130	...	...
160,000	,,	Dec. 14	5½	5½	Do. 5½ p.c. Rd. Db	110—115	...	...
370,000	,,	Feb. 15	4	6	York Cons.	105—110	...	...
90,000	,,	Dec. 14	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...	...
133,640	,,	Mar. 1	6½	6½	Yorktown (Cam.) 5 p.c ons.	130—135	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
35,000	,,	Dec. 14	5½	5½	Do. 5½ p.c. Deb.	125—130	...	...

a The quotation is per £1 of Stock. b Actual for Quarter. * Ex div.

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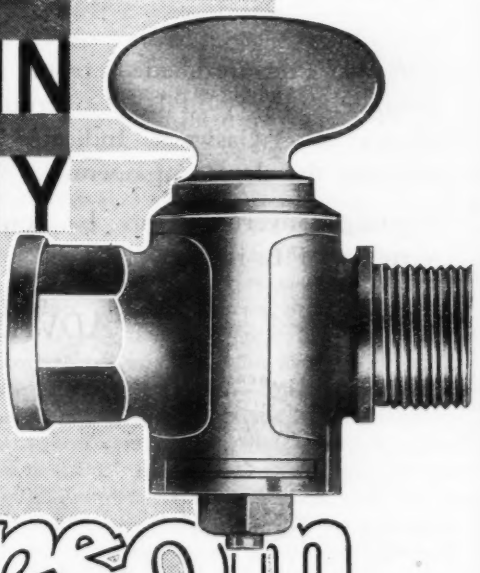

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